DOCUMENT RESUME

ED 309 942 SE 050 776

| | |
|---|---|
| TITLE | Afro-Arab Training Course on the Incorporation of Environmental Education into Industrial Education (Cairo, Egypt, November 12-24, 1988). |
| INSTITUTION | Ain-Shams Univ., Cairo (Egypt). Inst. of Environmental Studies and Research. |
| SPONS AGENCY | United Nations Educational, Scientific, and Cultural Organization, Paris (France). Environmental Education Section. |
| PUB DATE | Nov 88 |
| NOTE | 141p.; May not reproduce well due to shaded background. |
| AVAILABLE FROM | United Nations Educational, Scientific, and Cultural Organization, 7 place de Fontenoy, 75700 Paris, France (price not available). |
| PUB TYPE | Collected Works - Conference Proceedings (021) |
| EDRS PRICE | MF01 Plus Postage. PC Not Available from EDRS. |
| DESCRIPTORS | Conservation (Environment); *Developing Nations; *Environmental Education; Foreign Countries; *Industrial Education; Integrated Activities; *Interdisciplinary Approach; *Natural Resources; Postsecondary Education; *Science and Society; Secondary Education; Teaching Methods; Technical Education; Trade and Industrial Education; Vocational Education; Workshops |
| IDENTIFIERS | *Africa |

ABSTRACT

The objectives of this workshop were to: (1) familiarize participants with the development of environmental education (EE) and its need and place in industrial education (IE); (2) orient participants with guidelines for the incorporation of EE into school curricula and teacher training for industrial schools; (3) enhance exchange of information and experience through the preparation and presentation of country reports on the development of EE in the context of IE in the participating member states; (4) suggest strategies for the incorporation of EE into the curricula and teacher training programs for industrial schools by the participants for their countries; and (5) build prototype units in industrial education using EE components. This document presents the proceedings of the course, teaching strategies, two example EE units, speeches, lists of participants and resources, six presented papers, and reports for two educational field trips. (CW)

**********
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
**********

ED309942

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Susanne Adlung

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

# AFRO-ARAB TRAINING COURSE ON THE INCORPORATION OF ENVIRONMENTAL EDUCATIOIN INTO INDUSTRIAL EDUCATION

Organized by

The Institute of Environmental Studies and Research
University of Ain-Shams

In Cooperation with

The International Environmental Education Programme

UNESCO / UNEP

CAIRO-EGYPT

12-24 Nov. 1988

SE050 776

BEST COPY AVAILABLE

# AFRO-ARAB TRAINING COURSE ON THE INCORPORATION OF ENVIRONMENTAL EDUCATIOIN INTO INDUSTRIAL EDUCATION

Organized by

The Institute of Environmental Studies and Research
University of Ain-Shams

In Cooperation with

The International Environmental Education Programme

UNESCO / UNEP

CAIRO-EGYPT

12-24 Nov. 1988

Opinions and views expressed in this FINAL REPORT are those of the participants of the Afro-Arab Training Course on the Incorporation of Environmental Education into Industrial Education and do not necessarily reflect the official position of UNESCO.

Table of Contents


| | | Page No |
|---|---|---|
| I | INTRODUCTION: | |
| | 1.1 Background | 1 |
| | 1.2 Objectives | 1 |
| | 1.3 Agenda | 2 |
| | 1.4 Data & Venue | 2 |
| | 1.5 Participants & Observers | 2 |
| | 1.6 Bureau | 2 |
| | 1.7 Working Groups | 2 |
| | 1.8 Steering Committee | 3 |
| | 1.9 Working Documents | 3 |
| | 1.10 Unesco Secretariat | 3 |
| II | PROCEEDINGS OF THE COURSE : | |
| | 2.1 Opening Session | 4 |
| | 2.2 Plenary and Group Sessions | 5 |
| | 2.2.1 Plenary Sessions | 5 |
| | 2.2.2 Group Sessions | 17 |
| | 2.3 Closing Session | 18 |
| III | PRESENTATION OF COUNTRY REPORTS. | 20 |
| IV | SUGGESTED STRATEGES FOR THE INCORPORATION OF ENVIRONMENTAL EDUCATION INTO INDUSTRIAL EDUCATION IN THE PARTICIPATING COUNTRIES. | 24 |
| V | ENVIRONMENTAL EDUCATION UNITS DEVELOPED BY THE COURSE PARTICIPANTS: | 41 |
| | 5.1 Constructing a family house, starting from site selection to excavation. | 41 |
| | 5.2 Waste Management in Wood-work. | 49 |

APPENDICES


A.1 Timetable of work. 56

A.2 Opening Session Speeches :

2.1 Welcome Address 58

2.2 Statement for the Opening Session 59

2.3 Welcome Address 63

2.4 Inaugural Address 64

A.3 Closing Session Speeches. 67

A.4 List of Participants. 73

A.5 List of Resource Persons. 74

A.6 List of Country Reports. 75

A.7 Documents Presented

7.1 Environmental Education & Its Incorporation into Industrial Education. 76

7.2 Resume of Environmental Education in Technical and Vocational Education. 92

7.3 Resume of Strategies for the Incorporation of Environmental Education into Curriculum and Teacher Training in Industrial Schools. 104

7.4 Summary of Case Study on the Incorporation of EE Into the School Curriculum and Teacher Training of Technical School in Singapore 106

7.5 Case Study on Incorporation of EE into Industrial Education in Jamaica. 109

7.6 Summary of Case Study of the Incorporation of EE in the School Curriculum and Teacher Training of Technical Schools in Czechoslovakia, 118

A.8 Report of Educational Field Trips:

8.1 Visit to Alexandria. 129

8.2 Visti to Helwan Iron and Steel Industry. 129

# I- INTRODUCTION

## 1-1 Background:

The Institute of Fnvironmental Studies and Research (IESR), University of Ain Shams (UAS), Cairo, Egypt, in collaboration with the UNESCO-UNEP International Environmental Education Programme ( IEEP), organised the Afro-Arab Training Course on the Incorporation of Environmental Education into Industrial Education. The course was organized within the context of Unesco Programme and Budget for 1988-1989. Objectives, agenda, documents, list of Member States to be invited, financial contribution, provided by UNESCO in consultation with IESR. Planning of the course was done by a Consultation Committee consisting of experts from other Egyptian universities and institutes besides the IESR.

The Institute of Environmental Studies and Research provided resource persons coming from different educational and academic institutes and centers in Egypt. Resource persons contributed in lecturing, leading discussion sessions, and participating in the workshop.

Invitations to nominate participants from among planners of industrial education, to attend the course, were sent to Arab as well as to African countries of English expression, through the courtesy of the Egyptian National UNESCO Commission.

The IESR facilitated the issuing of tickets, provision of accommodation, transportation, managing educational field trips, and other administrative needs of the participants throughout the period of the course.

As part of the design of the course, IESR included workshop activities in the programme for enhancing the participants' capabilities in planning and developing courses or teaching units as an activity that could help the participants in disseminating their experience gained through the course to others in their countries.

## 1.2 Objectives:

i) To familiarize participants with the development of environmental education (EE) and its need and place in industrial education (IE).

ii) To orient participants with guidelines for the incorporation of environmental education into school curricula and teacher training for industrial schools.

iii) To enhance exchange of information and experience through the preparation and presentation of country reports on the development of EE in the context of industrial education in the participating Member States.

iv) To suggest strategies for the incorporation of EE into the curricula and teacher training programmes for industrial schools by the participants for their countries.
v) To build prototype units in industrial education using EE components.

1.3 Agenda

i ) Opening session.
ii) Lectures on environmental science and industry and its impact on resources.
iii) Presentation on the experiences of UNESCO-UNEP International Environmental Education Programme.
iv) Presentation of country reports.
v) Place and need for EE in IE.
vi) Review of the strategies for the incorporation of EE in curricula and teacher training for industrial schools.
vii) Presentation and discussion of case studies on the incorporation of EE in industrial education ( Singapore-Czechoslovakia - Jamaica).
viii) Preparation of teaching units through group work (workshops) and strategies at national level through individual work.
ix) Educational field trips.
x) Study of draft final report.
xi) Closing session.

1.4 Date & Venue:

The Course was convened from 12-24 November 1988 at Zaafaran Palace, in the premises of Ain-Shams University, Cairo, Egypt.

1.5 Participants and observers:

Ninteen participants and observers attended the Training Course from Ethiopia, Iraq, Kenya, Kuwait, Nigeria, Somalia, Sudan, Tanzania and Egypt ;(for names and addresses see Appendix A.4)

1.6 Bureau:

Participants elected the following persons as the Bureau of the Course:
Chairman: Mr Abdulazeem Yaseen Abboud (IRAQ).
Vice-chairman: Mr Terfassa Digga Gumma (ETHIOPIA).
Rapporteur: Mrs Ellen Asuko Wanaswa (KENYA).

1.7- Working groups:

Group I:
Mr. Abdulazeem Yaseen Abboud (Chairperson).
Mr. Abdelrahman Ahmed Abdallah.
Mr. Ismail Ahmed Magan.
Mr. Magdi Maher Masiha.

Group II:
Mrs. Ellen Asuke Wanaswa ( Chairperson).
Mr. Terfasse Digga Gumma.
Mr. Mustapha Ajilo Shekoni.
Mr. Ephraim A.A. Massawe.
Mr. Nazek Almohamadi Osman.

1.8 Steering Committee:

Chairman: Dr. Mohsen Tawfik, Professor and Dean (IESR).
Advisor: Dr. Abdul-Ghafoor Ghaznawi (UNESCO, Paris).
Members: Dr. William Ebeid, Professor and Vice-Dean Faculty of Education (UAS).
Dr. Saber Selim (Prof., Head of EE Dept, IESR).
Dr. H. El-Etr ( Fac. of Sci., Ain Shams Univ.).
Dr. Samir Ghabbour (Professor, Cairo University).
Dr. Hussein Bashir Mahmoud (Consultant, National Center for Educational Research).
Dr. Adly Kamel Faraq (Consultant, Min. of Education).
Dr. Abu-Bakr Abdeen (Consultant, Min. of Higher Education).

1.9 Working documents:

Seminar working sessions were enhanced by the presentation and discussion of the following documents:

i ) Environmental Education and its Incorporation into Industrial Education.
ii) Environmental education in Technical and Vocational Education, Unesco, 1984.
iii) Strategies for the Incorporation of Environmental Education into Industrial Education, Unesco (draft).
iv) Case Study on the Incorporation of Environmental Education into School Curricula and Teacher Training of the Technical Schools in Singapore, Unesco (Draft).
v) Case Study on the Incorporation of Environmental Education into School Curricula and Teacher Training of Technical Schools in Jamaica, Unesco (draft).
vi) Case Study on the Incorporation of Environmental Education into School Curricula and Teacher Training of Technical Schools in Czechoslovakia, Unesco (draft).

1.10- Unesco Secretariat:

Dr. Abdul-Ghafoor Ghaznawi, Programme Specialist in Environmental Education, Division of Science, Technical and Environmental Education (UNESCO, Paris).

## II- PROCEEDINS OF THE COURSE

### 2.1 Opening Session:

the Opening Session of the Afro-Arab Training Course for the Incorporation of Environmental Education into Industrial Education took place in the late Prof. M.Kamel Hussein Hall at Zaafaran Palace, University of Ain Shams, Abbasia, Cairo, on the 12th of November 1988 at 5.30 p.m. It was attended by staff members of the Inst. of Environmental Studies and Research, the trainees from Arab and African countries, and a number of scientists and decision-makers from the fields of education and of industry. Dr. A.F. Sorour, Minister of Education, honoured the Session by his presence. Prof. M. El-Hashimy, President of the University of Ain-Shams, presided the Session.

In introducing the speakers of the Opening Session, Prof. M.A. Tawfik, Dean of the Institute of Environmental Studies and Research, said that just one example is enough for clearly demonstrating the impact of industry on the environment, and that is the impact of energy utilization.

Environmental education is therefore a must for the people in industry, at school and in the factory. This Training Course will try to answer the very important question: How to incorporate environmental education into industrial education in Arab and African countries? All of which have large natural resources and old cultures. We are here not to discuss principles but rather to produce examples for education programmes applicable in the Afro-Arab region (For full text see Appendix A. 2.1)

The next speaker was Dr.Abdul-Ghafoor Ghaznawi, IEEP Unesco, Paris. He explained the objectives of the Course as to familiarize participants with the development of environmental education (EE) and its need and place in technical and vocational education, to develop guidelines for the incorporation of environmental education into industrial education and to enhance exchange of information and experience in this field.

Dr. ghaznawi further added that industry is a neutral process. Its environmental impact depends on how carefully it is planned and managed. This responsibility lies with decision-makers, engineers, the skilled and semi-skilled technicians as well as the industrial labour force who should receive appropriate environmental education, through preservice and inservice programs ( For full text see appendex A.2. 2 ).

Prof. M. El-Hashimy, President of Ain Shams University welcomed the audience at the Opening Session, He began by pointing out the increasing impact of man upon nature and added that new technologies of the twentieth century have caused so many changes that nature may no longer be able to cope with man's destructive activities. Man has to revise his actions and his attitudes,and this is the crucial role of environmental education, which should aim at realizing a balance between human needs and the safety of ecological systems. It means man's attempt to get out of the impasse by the acquisition of knowledge, and concepts and understanding of the intricate relationships between environmental components. (for full text see Appendix A-2-3).

H.E. Prof. A. fathi Sorour began by reviewing the major environmental problems faced by the world today,first and foremost among which is ignorance about facts, lack of experience, and gross misbehaviour. He emphasized that the logical approach is environmental education. Therefore Egypt is radically revising her educational system so as to become environmentally oriented in order to enter the twenty-first century with precise objectives and clear-cut methodologies. Efforts are being taken to develop pre-University education programmes, and new text-books for secondary school education reflect this new environmental approach very clearly. At first degree university level,several environmental courses related to a number of professions in the Faculties of Education, Science, Commerce, Law, Agriculture, Engineering, and Medicine, are taught wherever feasible, but these courses remain unconnected. However, an important achievement has been accomplished by establishment of the Institute of Environmental Studies and Research at the University of Ain-Shams. Its aim is to prepare national cadres needed for protecting the environment and for its development, in all specializations: medicine, engineering, agriculture, science, humanities, etc. These training activities are carried out in such a way that all human experiences are integrated so that the graduate is fully aware of all aspects of problems of his environment, thereby capable of suggesting logical and practical solutions for such problems ( For full text see Appendix A.2. 4 ).

2-2- Plenary and Group Sessions:

Sun. 13 Nov. 1988
Industry's Needs of Resources:
2.2.1. Plenary Sessions:

The scientific sessions began on Sun. 13 Nov. by an introductory presentation given by Prof. M.A. Tawfik, Dean of the Inst. of Environmental Studies and Research, in which he explained what is meant by Environmental Systems.

The earth's environmental system comprises the total frame work that consists of the earth, what is on it, as well as its atmosphere. Its inputs are cosmic factors that do affect the earth's environmental system and shape its components. These inputs are solar energy, gravitational pull, cosmic rays, shooting stars, and electromagnetic waves. Its outputs are reflected solar energy together with other radiation produced on the earth, the effects of the earth's magnetic field, and later or due to human enterprise, spaceships and satellites.

The main environmental system of the earth is a conglomeration of a number of interacting subsystems which are really beyond our capacity to enumerate. These are so numerous that they may well be infinite, according to the level of detail that could be reached. Therefore, the definition of the model of the environmental system will depend on the kind of required study. For example, if we wish to study energy flow and exchange of materials within the system, it can be represented by two main sub-systems: a sub-system for living materials, and another for non-living materials. Study will be conducted on energy flow as radiation and on material exchange as cycles between the two sub-systems. Also, if the aim is to study man and his environment, the main system can be represented by two sub-systems: one is man and the other his ambient environment. Also, if the aim is to study environmental equilibrium, sub-systems will be defined by one representing the environmental space and its dynamics and the others representing the groups of effective living organisms, and so on. Again, detail of study of the main system or the sub-system will depend on the details required for the study.

from the point of view of man, the sustainability of his existence and his viability at present rates of reproduction may lead to environmental disequilibrium in several regionss if not on the scale of the entire system. Threats of human interventions to the equilibirium of environmetal systems and their operations, move from simple qualitative changes to wide-ranging qualitative/quantitative effects. This makes it imperative for man to modify his concepts about environmental systems, from the idea of subjugation to the idea of coexistence and development.

The study of the present situation of disequilibrium in environmental systems requires the understanding of human systems and of ecological systems as two interacting subsystems, and the identification of their components and changes which cause malaise within them and in their interrelationships. From this we can proceed to knowledge about how to rectify these flaws. Within the scope of the human sub-system, it is quite clear that any solution to environmental problems must rely on environmental education.

Dr. Ghaznawi followed by presenting a paper on environmental education and its incorporation into industrial education. He pointed out that the most comprehensive definition of the environment came out in the work of the Intergovernmental Conference on Environmental Education of Tbilisi, USSR, October 1977. Environment has a holistic nature embracing different physical, chemical, biological, social, cultural, economic, political, etc..., dimensions interrelated with and interdependent on each other. It was a lack of comprehensive knowledge about the total environment, its components, their interrelationships and interedependencies on the part of humanity on one hand and use of new machineries and technologies and harnessing of enormous energy on the other, which led humanity to treat the environment as if it were a resource without limitations. The obtaining of such knowledge is essential, therefore, for sound interventions in the environment as a guarantee for sustainable development. Environmental science institutions, such as IESR,can translate this into educational messages and disseminate them to all layers of society through formal and non-formal education efforts.

Dr. Ghaznawi went on to explain the goals, objectives and guiding principles of environmental education in general, and its developments untill the review and follow-up of the Tbilisi Conference was carried out at the International Congress on Environmental Education & Training, Moscow, USSR, Aug. 1987.

He concluded that environmental education is the educational process through which is imparted to its target groups the environmental sensitivity,awareness, knowledge,attitudes, ethical responsibilities, etc.,, needed for understanding, protection and improvement of the environment.

As far as the environmentalization of industrial education is concerned, it is essential to establish the needed mandate and responsibility for its institutions to abide with. The EE dimension of a curriculum designed for industrial schools may be delivered through different mechanisms depending on the priorities of industrial education institutions for integratingenvironment into their school curricula and teacher education programmes. A module developed on the concept of energy was presented as an example. Then lists of topics for schools and faculties to be integrated into curricula were suggested. As for teacher training, it may be reasonable to give priority to in-service training of industrial school teachers in order to have immediate results with today's generations. EE advocates the use of the environment as a living laboratory, specially when learning by doing is its main approach for teaching.Moreover, particular emphasis may be placed on the inclusion of the

environmental dimension in examinations as a quarantee for its viability. Finally, it is concluded that the fundamental task in the teaching of EE is to inculcate sound environmental attitudes and ethical responsibilities leading to sound civic actions. The immediate need is to develop effective instruments for evaluating this type of achievement. This is a high priority as regards industrial education. ( For full text see appendix A.7.1).

The third presentation was on the structure and function of ecosystems and the concepts related to this basic unit of the environment, given by Prof. Adly K. Farag, Prof. Emeritus, Min. of Education. the ecosystem is a somewhat clearly defined part of the biosphere, comprising air, soil and water, and in which plants and animals live in a state of equilibrium by exchanges of matter and by a continuous flow of solar energy. Green plants absorb this energy, salts and water, and $Co_2$ from the air, and synthesize sugars, amino acids, and build them into starches, cellulose, fats,and proteins. They are therefore called the producers. Animals that eat plants, whether elephants or aphids, feed on the organic matter produced by green plants, and are thus consumers. Other animals may eat herbivorous animals (the carnivores), and may therefore be called secondary consumers. During their life, plants and animals shed parts of their bodies to the ground and after their death, their entire bodies fall to the ground. These rich stores of organic matter are decomposed by a variety of decomposers: bacteria, fungi, protozoa, worms, insects, etc.., into the original substances of CO2, other gases, salts and water. However, all the energy gained from the sun is dissipated into the atmosphere during the life of these organisms, and the same amount of material, can be recycled in the same way, provided a new supply of solar energy is obtained and utilized by the green plants. therefore the two fundamental laws of ecosystems are the cycling of matter and the one-way flow of energy. Another aspect is that there is no surplus and no crisis.

The fourth presentation was given by Prof. S.I. Ghabbour, Dept. of Natural Resources, Inst. of African Research & Studies, Cairo University, on biotic resources and the industrial activity of man especially since the Industrial Revolution of the 19th Century.

The main theme of this presentation was that industry has enabled man to rely on mineral non-renewable resources (metal ores, coal, oil), rather than on plant and animal resources, which characterized farming and herding pre-industrial societies. In the case of industrial societies, decisions are no longer made by local people about their

local resources, but could be made in New York or London and affect people in Chile, Zambia or Malaysia. Therefore, there is almost no concern by decision makers in industry about the fate of resources or people living in areas remote from the center and having themselves no direct bearing on industrial processes or international commerce. But industry is also intensifying the exploitation of biotic resources: over-harvesting of forest timber by mechanical giant saws, over-fishing of the oceans by mechanized boats and helicopters, and the over-irrigation and over-cultivation of agricultural fields by tractors, aerial spraying of pesticides, etc..., Industry has also allowed monocultures by the development of agro-industries. Growth of industrial activity has also engendered growth of cities and attraction of rural people, leaving their fields tended by less able-bodied producers. A distinction was made between the term exploitation, often used by the industrial society, and the term utilization, usually used by farmer and herder societies. the latter aims at sustainable development and conservation of resources for the benefit of succeeding human generations. Exploitation, on the other hand, is regarded as the ideal case by our modern economy, conceived as the maximization of profit and the minimization oftime and hence disregarding options for the future.

Mineral resources:

Prof. H.A. El-Etr, Faculty of science, Ain Shams University, discussed industry's needs of mineral resources. He pointed out the benefits provided by minerals for civilization and the significance of minerals to the national economy. Mineral resources are unevenly distributed. Metallogenic provinces (or mineral belts) are regions where mineral commodities concentrate because of geological controls. Hidden ores (blind) need sophisticated techniques of prospecting and extraction, such as open or subsurface mines. It is necessary to study the supply and use of minerals and ways of satisfying the growing volume and complexity of human needs of minerals. Minerals are nonrenewable resources. The supply of minerals required to satisfy the demands of human society depends on several geographic and societal factors. Consumption increases with increasing per capita income. Factors such as price structure, expanding technology, new uses of known minerals, etc., determine the balance between supply and demand in the world of minerals.

Energy Resources:

Prof. Amin Mobarak (Faculty of Engineering, Cairo University) gave a synopsis of the energy resources available to industry, and stressed the history of their utilization. Extraction of coal and petroleum was the human discovery that really triggered the industrial revolution of the 19th century. The discovery of nuclear energy in the 20th century did not produce the same revolution yet.

He also differentiated between renewable and non-renewable energy courses and indicated that the future holds promising prospects for the combination of solar and wind energy wherever possible. The speaker explained aspects of mining for fuel energy sources and the efficient use of energy in factories and workshops to minimize unnecessary losses. Energy is becoming a limiting factor in industrial production, and its concentration in large agglomerations is creating grave environmental problems. Among the most notable environmental effects of industrial energy use are acid rain, increase of atmospheric carbon dioxide, and increase of global temperature. Technologies for reducing requirements and quantity of effluents have been successfully devised in the last decades. In order to reduce heavy dependence on energy inputs in industry,

Industrial Impact on water Resources:

Prof. (Mrs).Fatma El-Gohary, Head of Water Pollution Research Lab. at the National Research Center (Cairo), spoke about the impact of industrial activities on water resources. She pointed out the various kinds of liquid effluents that are produced by industrial activities, and the need of industry for huge amounts of adequately clean water for cooling as well as a raw material for production. Water consumption varies from one factory to another, even for the same industry and size of factory to as much 5 or even 20 to one. The principal reason for this wide range is the in-factory recirculation within the operation. Consumptive use of water in industry rarely exceeds 20% of withdrawal. The problem of waste water disposal is more limiting financially than the problem of obtaining adequate water supplies. Further growth and sophistication of industrial production will endanger further the world's water supplies unless measures for quality control and in-factory waste treatment are included. The variety of synthetic non-biodegradable organics and other effluents will undoubtedly increase. Besides the high percentage of industry's share in demands on water resources, reaching 50 to 80% in industrialized countries; these have a higher per capita water withdrawal. The highest amounts of discharged waters are from the chemicals and metallurgy industry and the lowest from the electricity machinery, rubbers and plastics industries.

Hazardous Wastes in Industry:

Prof. Mohsen Tawfik (IESR), then took the rostrum to explain the situation about hazardous wastes in industry. A number of countries have defined hazardous wastes in terms of toxicity to humans. Whenever a waste is recyclable this is to be considered as beneficial for society. Most dangers occur when attempts are made to move these wastes from one place to another, either for recycling or for definitive disposal, or for hiding. Substances considered

hazardous wastes can also be explosive and corrosive chemicals. They could be also old medicine or paint thinners, with no apparent immediate harmful effects. These substances should be subject to strict monitoring and control. Adequate disposal will cause more costs of production. Such materials are either stored, buried (on land or in the sea), burned, or made to undergo a physical and/or chemical transformation, which could yield a marketable product. Conditions of waste generation and management vary from one country to another. The key issue in the context of developing countries is how to institute some means of monitoring and control of hazardous wastes. This will involve export-import considerations and constraints in international relations.

Air Pollution:

Prof. M.M. Nasralla, Head of Air Pollution Dept., National Research Council, discussed problems of air pollution as related to industrial activities. The major sources of man-made pollutants are combustion processes of fossil fuel in power plants and other combustion devices, and industry which emits a wide range of pollutants into the atmosphere. Air pollutants may be primary, such as No, $SO_2$, CO ...etc., or secondary, such as: ozone, polyacetyl-nitrate and several other substances which result from the reaction of primary pollutants. Air pollution causes skin and eye irritation, let alone lung diseases. Air quality criteria are descriptive, as they describe effects that can be expected to occur whenever the ambient air level of a pollutant reaches or exceeds a specific concentration for a specific time period. For any pollutant, air quality criteria may refer to different types of effects.

Water pollution:

Prof. F. El-Gohary discussed the health problems arising from the use of contaminated water in rural areas, less privileged with respect to water supply and sanitary facilities, and although the population is less dense, waterborne and water related diseases are among the major causes of sickness and death. Waste disposal from industries leads to a reduced fish population in the rivers and lakes causing nutritional deficiencies in the human population and the need to import canned or salted fish. Industrial wastes are identified as the major source of water pollution. Leakage may kill vegatation and fauna in wide areas, especially in bays and estuaries, Groundwater resources may also be contaminated. Pesticides and fertilizers, as industrial products, are also a major source of water pollution in rural areas, and eventually find their way, together with metals and non-metals, to human food. One issue common to all developing countries is the use of

pesticides which have not been adequately tested or are banned in their countries of origin.

Industrial Education for a Better Environment:

Dr. Abu-Bakr Abdeen, Consultant, Ministry of Higher Education, discussed the role of industrial education in mitigating the negative effects of industrial activities on the environment. There are three reasons for this assumption:(1) industrial education graduates can influence the environment, (2) they participate in a wide range of industrial activities, and (3) they are themselves directly affected by the environment as workers in factories or workplaces and as citizens. Education programmes should provide individuals with skills, knowledge, awareness, attitudes and participation related to the particular risks of their areas of specialization There are certain difficulties which industrial education of this sort has to face. However, industrial education must face the same challenges like any other types of education, namely the need to address the affective domains. There must be an internal desire and satisfaction to protect the environment for the benefit of the whole of mankind and for future generations.

Chemical Impact of Industry on Human Health:

Prof. Ali. Massoud, said that in the U.S.A., the most recent list of threshold limit values for airborne contaminants contains permissible limits for almost 600 chemical agents, and thresholds in exposure to particulate matter, and other countries agree on these substances but differ in setting limits which may differ by a factor of 10 or more. An ILO/WHO Joint Committee recommended safe concentration "Zones" for international adoption for 24 substances. This recommendation is still being debated particularly with regard to its application in developing countries where there is said to be wide variation in human susceptibility and tolerance, depending on the general health level and endemic diseases and a number of other factors. Decisions based on actual cases of human exposures to different levels of toxic agents must be considered superior to extrapolation from animal studies. Figures for annual incidence of occupational diseases indicate the level of care given to a healthy industrial working environment. Small firms remain of particular concern such as printing, chemicals,paints, solvent and metal recovery, and rubber processing. The suggestion to recycle industrial wastes by specialized small industries should be accompanied by strict health precautions.

Physical Impacts of Industry on Human Health:

Prof. Rifky Faris, Faculty of Medicine, Ain Shams University, discussed physical agents in the environment and their effects on human health. these are: temperature, radiation, noise and vibration, atmospheric pressure, and electric and magnetic fields. Failure of the system regulating body temperature results in heat disorders. Suitable clothing has to be used. Non-ionizing radiation causes heat to the tissues. Ionization results in severe destruction of tissues, followed by malignancy and congenital anomalies. Vibrations may result in damage to the blood supply of the hands, followed by complete blockage, Sudden drop of atmospheric pressure may result in rapid release of gases from tissues and body fluids. High electric power and strong magnetic fields may have harmful effects on health but these are not fully proven.

Periodical Medical Examinations (PME)

Dr, A.M. Kamal, Faculty of Medicine, Ain Shams University presented the benefits of Periodical Medical Examination (PME) to anticipate occupational diseases. the causal agents can be identified, measured, and controlled. The population at risk is easily accessible and regularly supervised. The initial stages of the disease are often reversible if promptly treated. care must be taken to detect early changes that precede the occurence of manifest signs and symptoms. Changes which can be detected are in biochemical, morphological, physical status and body functions, and general well-being. Periodicity of medical examination should be guided by factors such as: natural history of the disease, level of exposure, and individual risk factors and anticipated susceptibility of the exposed individuals or populations, etc. Health education is recommended as a part of PME. This will lead to more cooperation by workers, better utilization of health services, encouragement of prophylactic measures, and correction of false believes and attitudes.

Occupational Health Services in Industry:

Dr. M. Gadallah, Faculty of Medicine, Ain Shams University stated that occupational health services concentrated their activities around diseases such as silicosis. Now there are certain work related diseases such as ischaemic heart diseases, psychological disorders, etc. , which are often more common than occupational diseases, especially after declining of the latter through effective preventive measures.

Occupational health is important as a national priority because workers are exposed to specific hazards associated with the nature of the industrial activity. Objectives of occupational health services are: Promotion of public health, prevention of occupational diseases, and identification and control at workplace of chemical, physical and other

agents that may cause health hazards. In addition, it helps to discover and improve unhealthy work situations. Such objectives are achieved through medical services, environmental services, and health legislation.

Environmental Education:

Dr. H. Bashir, Consultant, National Center for Educational Research, discussed the major issues of environmental education (EE) as follows: objectives to produce citizens knowledgeable about the environment that it is interdisciplinary, that it is classified into four major conceptual areas. EE should have characteristics such as integration and coordination, be action- oriented, given with intensive training, continuous, could emphasize societal concerns, stress attitudes and participation, be considered in its totality, and emphasize the active role of the learner .

Industrial Education:

According to the document provided by IEEP, and authored by S. Grabe (1987), the general hierarchy and social aspects of industrial education were discussed. In higher education studies are primarily theoretical with a complement of laboratory type activities. The same trends are found at the intermediate levels of technical education, although the theoretical part may be less prominent, depending on financial and technical considerations of the country concerned. Traditional forms of skilled worker training through apprenticeship are still prevalent in many developing countries and at certain forms of economic activity. Attempts towards a revival of traditional, but improved, apprenticeship systems are not very successful because they are seen to deprive young adolescents of their full educational chances, or as a means to improve the lot of backward or handicapped boys and girls. A good formula is to establish links between schools and factories for summer training. These trends both facilitate and complicate the task of introducing environmental education into industrial education. Practical training necessitates coordination with a wider circle of institutions, authorities, and decision-makers, and requires a consensus of all parties within this circle.

Environmentally-oriented Industrial Education:

Planning environmental education for industrial education is a complex task because of the many levels at which such education must aim, the great variety of technical functions of involved personnel, and the many channels that must be

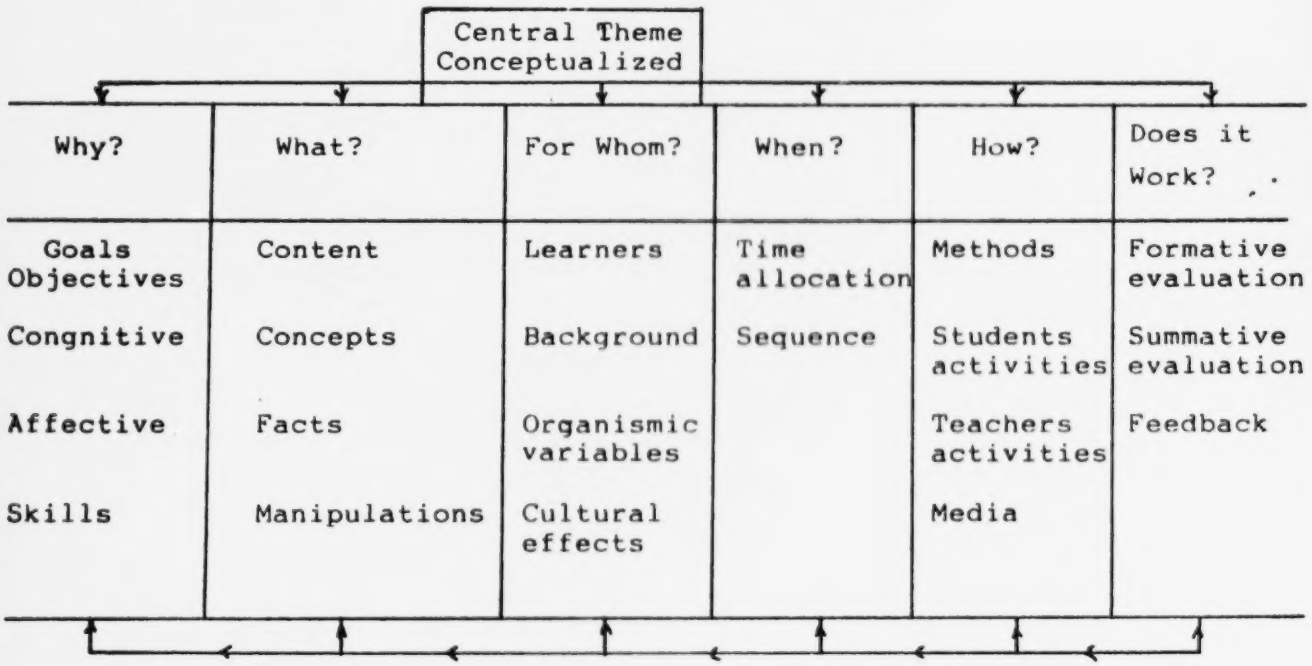
used for reaching the different groups concerned. However, because of the key role of technicians in industrial development and its impacts on the environment, this kind of education cannot be overlooked. The principal choices in planning relate to the place and form of environmental education in theoretical and practical instruction. For higher education,courses can be given about situations directly related to the occupational areas concerned. The basic message should be about environmental damage and appropriate technolgies. At intermediate levels objectives of EE are the same, but with a different approach, concerned mainly with the practical application of technologies for environmental protection and improvement. They will need to be more specific, such as for the two modules on construction and forestry developed by the working groups of this training Course, referred to as "Teaching Units"

Building teaching Units:

Prof. William Ebeid, Vice-Dean, Faculty of Education Ain Shams University, presented to the participants of the Training Course guide-lines for building teaching units.

An instructional Unit is a body of learning experiences related to a central core of thought. As the term shows, the unit is constructed with the idea that the unity involved is within or among the elements of subject matter or experiences which make the unit. In our case, the central core is some environmental aspect, i.e., erosion, wood insects, mining hazards....etc.

To build a unit, we can follow a system-approach which can be summarized as follows:




Dr. Ebeid explained the components of this schemator and gave illustrative examples. He mentioned that these components are not necessarily linear and the impact of the feedback on each of these components is not always explicit.

2.2.2. Group Sessions

A main activity of this Training Course was experiential learning by means of group sessions. This activity was a shift from the lecturing-listening conduct which took place as mentioned before, towards more sharing and interaction among participants and between them and the staff. It had two-fold aims: (1) to get first-hand experience of a teaching-learning strategy in which the students become the active elements and the teacher turns to be a manager of the learning environment, with resource persons and materials being available, (2) to produce sample units so that the participants could feel that they are not mere recipients but also producers and have an active role in the course.

thus, the participants were sub-divided into two groups. Each group worked for 8 sessions which lasted a total of 20 hours. Resource persons from the staff were available for each group. The group was asked to produce a unit related to the theme of the course, i.e., incorporation of EE into industrial education, and in the light of the information they had about EE, industrial education, job assignment, building a teaching unit and their own experience. A good amount of discussion took place among the members of each group till they reached an agreement about a certain topic for the unit from among the topics they themselves suggested. Resource materials (books, pamphlets) and resource persons (specialists, educators) were present to serve the group's needs and consultations. A plan was settled for the unit as related to its objectives, content, activities, the role of the students and the teacher, evaluation policies, needed materials and teaching guidelines, besides specifications of the target students and the time allocation for the teaching unit under preparation.

The participants experienced a democratic way to work as a team, to exchange ideas, to interact and learn from each other and to make wise use of the available human/material resources. They shared moments of frustrations and moments of insights. Divergent and convergent thinking came now and then. Disagreements and compliances appeared here and there. Personal experiences were projected. Flexibility and rigidity both got their due share. But at the end there was a balanced group-work based on experiential learning and a concrete production of a team of paritcipants. two units were produced:

(1) Construction of a family house starting from site selection to excavation.
(2) Waste management in woodwork.

After having written drafs of the two units, each group presented its unit in a 3 hours plenary session and subjected it to comments by fellows from the other group and by staff members.

the two groups re-convened and considered the accounts given in the plenary session, then made the agreed-about modifications. The final versions of the two units are given in chapter V of this report.

## 2-3 The Closing Session

The closing session was held at 12.30 pm Thursday 24 Nov. 1988 at the late M.K. Hussein Hall at Zaafaran Palace, University of Ain Shams. Just before the session all participants and staff members of the Course were received by Prof. M. El-Hashimi, President of the University, in his office. the President greeted the group and congratulated them for the success of their work and stressed its importance for the improvement of human life in developing countries. He particularly pointed out the fact that this gathering of education specialists from Arab and African countries in Egypt, with the cooperation of IEEP, consitutes an important step in strengthening of cooperation and exchange of experiences in this field within the region. The President thanked all participants for their sincere efforts, and congratulated the staff of IESR and Dr. Ghaznawi for their effective collaboration and expressed his hopes for further cooperation in such useful endeavours.

In the Closing Session itself, Prof. M. Tawfik, Dean of IESR, said that he was most happy to realize from the evaluation questionnaires that evaluation was greatly positive and that it was felt results were useful.. Opinions as expressed in these questionnaires were fully free and constructive suggestions would certainly help IESR to further improve its efforts ( For full text see Appendix A.3.1).

Mrs. Soad Abdel-Rasool, Asst.-Sec: Gen. of the Egyptian National Commission for UNESCO, took the floor and said that the work done and the discussions that took place during the course highlight the fact that man may be the source, the agent and the ultimate aim of development; still it is incumbent upon education to fit him for his role. If education is to stimulate, rather than obstruct development, it must be firmly rooted in the environment and it must develop the creative capacities of individuals and accord equal apportunities to all. ( For full text see Appendix A.3.2).

Mr. Terfasse Digga, the representative from Ethiopia, asked to intervene and to talk on behalf of the participants. He said that the participants appreciate the valuable, co-operative and constant efforts of UNESCO and UNEP in trying to make our planet a place fit to live in and to create a valuable legacy for the generations to come. We are therefore grateful and thankful to UNESCO and its affiliated bodies for their efforts and foresight.

He went on to say that this Training Course had been beneficial by various amenities provided by Ain-Shams University and the organizing committee. The organizing committee made their stay in Egypt a memorable one and for these, they are grateful and thankful to everybody concerned. He thanked the Dean and Personnel of the Institute of Environmental Studies and Research, all the resource persons and the support personnel, for their services and cooperation, which made their stay a pleasant one (For full text see Appendix A:3.3).

Finally, Dr. Ghaznawi explained that UNESCO hopes that the knowledge and experiences gained during this two week Training Course will be of service to the participating Member States in their renewal of industrial education through the incorporation of environmental education. This responsibility lies on the shoulders of the participants of the Course. He wished them every success in carrying out this responsibility which may lead to better understanding, protection and imporvement of the indoor and outdoor environment by the industrial manpower. With this he announced the Afro-Arab Training Course closed.
( For full text see Appendix A:3.4).

## III- PRESENTATION OF COUNTRY REPORTS

Participants of eight participating countries presented a country report concerning his/her country's experiences and prospects in the incorporation of environmental education into industrial education. The following is a condensed presentation of the country reports:

### 3- Environmental Problems:

### 3-1 The Educational Ladder ( Pre-university)

The reports showed a diversity in the ladders. Some countries have two stages: elementary ( or basic ) and secondary. Others have three stages: elementary, intermediate and secondary. Vocational education is a stream in the secondary stages. Its duration varies from two to five years. The reports showed the following ladders:

| Schooling pattern | Technical & vocational Education |
|---|---|
| 5-3-3 Egypt | (3/5 Years) |
| 6-3-3 Sudan | (3/4 years) |
| 6-3-3 Iraq | (3 years) |
| 6-2-4 Ethiopia | (2/3 years) |
| 4-4-3 Somalia | (4 years) |
| 8-4 Kenya | (4 years comprehensive) |
| 7-4+ 2 Tanzania | (2 for A-level) |
| 7-5+2 Nigeria | (2 for A-level) |

### 3-2 Requirements Needed for Enrolment in Industrial Education

Most countries require intermediate certificate ( or equivalent) since it is a secondary stage. Egypt initiated a preparatory vocational school after the fifth grade starting this year 1988/1989, besides the regular secondary technical schools, some of which are for 3 years and others for five years. In some countries there are some vocational courses given in some elementary and general secondary schools.

### 3-3 Percentage of Enrolment in Industrial Secondary Schools compared with General Secondary Schools

No accurate statistics were reported. Given estimations are as follows:

about 65% all vocational, 45% of which industrial and 35% for general secondary - Egypt
about 33% Ethiopia
" 10% Iraq
" 50% Kenya
No information - Nigeria
about 14% Somalia
" 10% Sudan
" 50% Tanzania

3-4 Main Fields of Study in Industrial Education

The following fields are reported:
- Mechanical and Electrical ( 6 countries)
- Electronics and Diesel Engine's: 4-5 countries
- Architectural, Cooling, Sanitary: 3-4 countries
- Woodwork, Plumbing, Power, Building, Car, Decoration, Railways, Petro-chemicals, Weaving ) 2 countries
- River and marine transport, 2 countries
- Mining: one country

However, it seems that the representatives did not have complete information in such a rapidly changing field and the given lists are therefore not exhaustive.

3-5 The Position of EE in the Process of Education

Environmental education is considered a must only in Ethiopia, Egypt and Kenya.

3-6 Justification for EE

The following is reported:
- The realization that the economy of the country is based on EE.
- Conservation and management of resources particularly water, soil, forests ( Kenya) and wildlife (Kenya).
- Awareness to encourage development and improve the health and well-being of citizens.

3-7 Objectives of EE in Industrial Education

The following objectives are reported where EE is introduced:
- To make the students aware of environmental problems;
- To make the students participate in protecting their environment;
- To know how to have safety in using tools and machines;
- To develop positive habits and attitudes amongst the students concerning the environment;
- To create a citizen who is knowledgeable of environmental problems;
- To enlighten industrialists about the environment and to give them the knowledge, skill and attitudes applicable to their working conditions.

3-8 Current Methods of EE development

The following were reported:
- EE is incorporated in different subjects in Kenya, Egypt, Sudan,-
- EE is a separate subject ( mainly) in Iraq; ( in technical institutes)
- Both incorporated and separate depending on the stage of school in Ethiopia;
- Not introduced or no information: Tanzania, Nigeria and Somalia.

3-9 Environmental Problems

All countries reported most of the following problems:
- Pollution ( different sources);
- Unplanned residential areas;
- Coastal erosion;
- Desertification;
- Soil erosion;
- Water management, aridity, drought;
- Waste disposal;
- Tectonism;
- Insect and other pests.

3-10 Environmental Topics Stressed in the Curricula

The following topics were reported (except from Tanzania, Nigeria and Somalia):
- Environment and pollution;
- Measurement of air pollution;
- Environmental pollution instruments and control;
- Enviornmental hygiene;
- Industrial waste-water treatment;
- Safety in unit maintenance workshops;
- Accidents;
- Vocational hygiene;
- Personal protection;
- Erosion;
- Dosimetry;
- Waste disposal;
- Deforestation.

3-11 Training of Teachers for Incorporating EE into IE

- No such training is reported in the cases of Iraq, Egypt, Kenya, Sudan, Somalia, Nigeria and Tanzania;
- Only Ethiopia reported teacher training in this area.

3-12 Constraints for Developing EE in IE

No problems were reported by Tanzania, Nigeria, Sudan, Kenya, Egypt or Iraq.
Somalia reported the need for the UNESCO help in the following fields:
- Training personnel;
- Supply of equipment;
- Supply of material;
- Sufficient financial resources.

3-13 Current EE Projects

- No projects were reported by Somalia, Iraq, Egypt, Kenya, Nigeria or Tanzania.

- Sudan reported that there are projects which aim at various educational level students. Their objectives are to make the students aware of the environmental problems of sudan, to protect the environment and to better use available resources. There is a recently-formed National Committee preparing a curriculum for various schools.
- Ethiopia reported that there are projects whose target groups are the adults specially the farmers. Their objectives are to enable them to care for soil, afforestation and waste disposal. The Ethiopian National MAB Committee is offering comporehensive advice in all aspects of the economic life of the Ethiopian people.

3-14 Conclusions

The country reports show that environmental education in eight Afro-Arab countries participating in the Course is a relatively new field of study. So far, environmental concepts are mostly embedded or infused into industrial courses particularly those related to safety and hygiene. Teacher training - if any - is still limited in the area of incorporating EE into industrial education. However, National Committees or similar bodies started to be formed here and there. There is a high level of awareness on the part of authorities concerning environmental problems. Plans for systematic policy development for the implementation and diffusion of EE is progressing and is becoming the concern of many agencies including the Ministries of Education in these countries.

---

in TVE should aim at making students aware of the specific environmental problems and risks. EE may be treated as a separate subject, but many of its aspects fit well into the teaching of other subjects. It should therefore better be a cross-cutting charactristic of all, or possibly all, subjects of technical and vocational education. The following is a brief expose of strategies adopted by some of the participating countries as regards this issue.

4.1 Ethiopia: By Mr. Terfassa Digga, Curriculum Department, Min. of Education, Addis Ababa, Ethiopia

4.1.1 The Ripening of Pre-Conditions for Industrialization and The Role of Education:

The manufacturing industry, mining, the exploration of oil, natural gas and the harvesting of hydroelectric power potential is in full swing. Achievements of historic proportion have particularly been scored since the outbreak of the 1974 Popular Revolution. Currently new insights are being introduced into the political, economic and social life of the people. Resettlement schemes and villagization programmes are being thoroughly carried out. The development strategies of the country require the training of higher and middle level technical and vocational skilled manpower. As a result of this, the number of technical and vocational schools is increasing steadily.

A total of 26 technical and vocational schools are presently being organized under the Ministry of Education. Most of them focus on agricultural skill. Teferi and Dilla TVS focus mainly on soil conservation and forestry. State and cooperative farm machine operators are trained in these schools. The TVS such as in Addis Ababa and Dessie train specialists in various crafts including wood-work, metal electricity, automechanics and other related subjects. These schools produce a large number of skilled manpower whose knowledge and activity may affect the environment positively or negatively. This makes the incorporation of EE into TVE an urgent necessity.

4.1.2. Efforts made so far to promote EE:

On the basis of guidelines issued by UNESCO-UNEP IEEP Conferences a number of environmental education programmes emphasizing training, material development, research, information exchange, etc., have been implemented by Ethiopia. The Programme of the Workers Party of Ethiopia and the Constitution of PDRE give high priority to the protection and care of forestry, wildlife, soil and water resources. Practical measures are being taken to enable the working people to undertake the oonstruction of dams and the harnessing of rivers to rehabilitate the environment. Formal education is playing a key role in this respect. Particular emphasis is given to EE in the social and natural science syllabi as well as in the home economics programmes. A "National Training Workshop on Environmental Education" was organized in 1983. An Environmental Education Project sponsored by the Ministry of Education is gaining influence in the drought affected Wollos region. The programme is part of an integrated plan of action emerging from the conservation-based development strategy adopted by the Ethiopian government. The implementation of the programme is principally with the Ministry of Agriculture. It will also be assisted by all other developmental ministries, popular organizations and the media.

4.1.3 The need to reinforce EE in the formal school system and particularly in the TVE sector (Industrial):

In order to improve the quality of the environment in the context of sustainable development and safeguarding ecological balance, there is a need to reinforce EE in the formal school system and particularly in the technical and vocational schools. The following strategies are, therefore, recommanded for the incorporation of EE into the educational system with emphasis on Industrial Education.

1. To implement the resolution of the Tiblisi Conference (1977) that EE should be made an integral part of the entire educational process and aimed at every category of the population:

1.1 The general public and non-specialists.
1.2 Socio-occupational catagories whose activities have a significant impact on the environment.
1.3 Scientists and technicians whose field, whether in the natural or the social sciences, concern the environment and who need to receive specialized training.

2. EE courses should be incorporated into the entire school system, including:
- Grades 1-6, 7-8, 9-12.
- The specialized schools, i.e., Industrial Education (11 and 12).

- Teacher Training Institutes and Colleges.
- The Universities.

3. A separate course of EE could be difficult to implement owing to the big number of school subjects. Therefore, it would suffice to continue intensifying the measures for incorporation already being undertaken with special emphasis on the industrial subject.

4. Teacher training must be geared to cater for preparing teachers of EE.

4.1 The office responsible for the development of instructional materials for the TTI's should organize manuals to be incorporated in social science courses such as Geography and History, Biology, Chemistry, Physics,etc.
4.2 The inservice programme should also follow suit.

5. The commission for Higher Education should see to it that all the branches of higher learning and particularly the engineering, technology and agriculture faculties, contribute their share to EE.
Studies should also be made to create an Institute of Environmental Studies and Research.
6. The Curriculum Department of The Ministry of Education must prepare itself for the review of the curriculum to strengthen the incorporation of EE at all levels.

7. The central state organs and the broad network of mass media must increase coverage about the environment.

8. The implementation of the general polytechnical instructional materials now under experiment may provide plug-in-points before dissimination.

Finally, measures should be taken to guarantee that government, mission, public, church, foreign community and organizations will follow the designed strategy.

4.2 Iraq: By: Abdulazeem, Yaseen Abboud:

Main objectives for Enrironmental Education incorporated into Industrial Education:

1. Considering the ethical, cultural social and economic features of the human environment.
2. Environmental Education should consider the real life problems.

3. Environmental Education should cover the problems for all population from all ages and different communities.

4.Developing new attitudes and behavioural patterns in people to stop deterioration of the environment.

5. Increasing awareness of the people toward environment in short and long term development.

6. Protection and preservation of natural resources to maintain the balance of ecosystems.

7. Encouragement of technological specialization which does not conflict with cultural patterns and suits local or regional circumstances to avoid reaction and conflict.

8. Solving environmental problems by solutions evolved from the country's educational system itself.

9. Encouraging research and studies concerning environmental education.

10. Promoting industries to train their students and teachers in technological and environmental areas.

4.2.1 Implementation of E.E. into I.E.:

Implementation of E.E. into I.E. should be done in two successive stages:

First stage:

1. Teacher training:
   a) Pre-service training to give knowledge and skill in E.E. as well as I.E.
   b) In-service training to give knowledge and skill in E.E. and to improve their I.E.

Second Stage:

Curriculum development by applying multi-disciplinary (infusion) model where EE components infuse into other established disciplines where appropriate.

The ladders of educational systems in which EE. can be implemented is suggested to be the secondary vocational school as a first step followed by the technical institutes and colleges and in the long term it might be extended to cover the middle and primary school.

4.2.2. Suggestions for Curriculum Development:

1. Organize a training course for EE by the Ministry of Higher Education and Ministry of Education in cooperation with UNESCO-UNEP International Environmental Education Program (IEEP).

2. Organize a curriculum development committee. (The members should be from Ministry of Education and Ministry of Higher Education ).

3. Identify professional consultants who can give recommendations and support at any stage of curriculum development.

4. Develop the curriculum scope and sequence:
Curriculum goals, concepts, skills and attitude and assign their sequence.

5. Evaluate the existing school programme with respect to potential environmental education infusion elements:
a) Identify Environmental education objectives which already exist in the present curriculum and try to modify others to meet environmental education objectives.
b) Complete the deficiences in the present curriculum by introducing or improving new material of EE.

6. Identify and evaluate the available resources for use in EE curriculum.

7. Prepare the EE curriculum:
a) Review and evaluate the materials which have been collected for potential adaptations or adoption.
b) Organize editorial teams to adopt or develop environmental education materials needed to complete the curriculum (trained expert lecturer with a good standard of environmental knowledge).

8. Develop plans for both pilot and full scale implementation.

9. Develop a comperhensive evaluation programme. Every course should be done individually by the experts of the subject as well as by environmental education specialists.

10. Besides the above activities other activities should be carried out and integrated such as:
1) Radio & T.V. programmes.
2) Seminars.
3) Conferences.
4) Newspapers and magazines.

These activities can be carried out by the Ministry of Education and Ministry of Higher Education as well as by the Ministry of Industry, Ministry of Health, Ministry of Petroleum and Minerals, Ministry of Housing etc.

Finally it is suggested to initiate a National Committee to guide, coordinate and control all activities concerning environmental education and environmental control which has been taken by different ministries all over the country.

4.3 KENYA By Mrs. E.A. Wanaswa.

Inner and Outer Environment Objectives:

1. Develop skills so as to be aware of the total developments in the environment.

2. Develop an environmental awareness.

3. Make adequate provisions in the use of the environment for (further development in the future) sustainable development.

4. Develop work habits that are economically viable, progressive and conservationist.

5. Demonstrate positive attitudes about the individual's work and the environment in his workplace at home and in the community.

4.3.1. Implementation:

a) EE should be incorporated into IE at all levels of secondary school beginning with grade 9.
b) Method of delivery should be by infusion into regular IE subject. In certain technical topics, integrated and team teaching should be used together.
c) The teachers trained before EE is introduced should be given an in-service course on content and methods in EE. EE should then be introduced at pre-service teachers colleges. A degree level technical teachers course ought to be inaugurated. Curriculum developers and inspectors in Technical Education need special and urgent in-servicing
d) Elaborate diagrams and drawings, pictures and texts on EE impacts that are current and relevant should replace hypothetical situations or incidents out of reach of learners.
e) The curriculum should be infused into the regular subject.
f) Exposure to the countrys' environment with special emphasis on the resource base for specific subjects under study. This resource should be seen to interrelate to other areas of the economy. Maximisation of resource use and protection of the environment should be encouraged. Industry should develop high precision skills and not just bulk-in orders.
g) Teaching methods should include exposure to actual experiences, visits to resource bases, visits to related economic industries; practical work, discussions, field attachments and demonstrations and environmental conservation measures in real life outside the industrial workshop but in the proximity of the industrial set up and related to it.
h) Pupils should be evaluated on their skills, knowledge, attitudes and awareness. Use of related checklists, tests observation, questionnaires and assessment should be encouraged.
i) Implementation should be urgent. First of all curriculum developers need an inservice course together with those in support of curriculum development. Next is the making of curriculum for teacher trainers, and teachers in training. At the same time induction courses should be given to already serving teachers.

4.3.2. A curriculum for the school system should be revised and EE infused into it. After in-servicing and inducting curriculum specialists and inspectors the stages of implementation and curriculum development at teacher training level and school level should be simultaneous.

BEST COPY AVAILABLE

## 4.4 SOMALIA By: Mr. I.A. Magan

Somalia appears like a figure seven and it is on the Horn of Africa. In the southern part the country is washed by the Indian Ocean and the Red Sea in the north. It shares boundaries with Djibouti. Ethiopia and Kenya. At present there are three main sea ports. The one in the north is Berbera and is along the Red Sea, Mogadisho the capital city is located on the Indian Ocean and the other one is Kisimaio. Somalia exports livestock, hides and skins and banana to different countries in the world and the economy of the country depends on them. Roads, telephones and an air-line are the systems of communication. There are two major rivers in the southern part of the country and the main farms are near these rivers. The major factories are:

Sugar factories.
Textile factory
Tanneries
Meat factory
Beverage factories
Cigarrette factory
Detergent factories and one food processing factory.

These factories play an important role in the life of the people.

In each of the 18 regions of the country there are elementary schools, secondary schools and some have technical vocational, marine, fishery, and commercial schools.

There are a total of 13 technicallyvocational secondary schools and 7 agricultural secondary schools, which could play a great role for the incorporation of environmental education into industrial education.

4.4.1. Main objectives for incorporating environmental education into industrial education are the following:

1. To orient the students to be aware of problems related to environment.

2. To advise students on how they should handle tools and instruments they use and also for safety precautions.

3. Students must be taught how to manage their environment.

4. To make them fully aware of the impact of the environment on society.

The above objectives of environmental education should be implemented in all stages of education levels.

### 4.4.2 Implementation

To deliver the above objectives EE should be incorporated into:

1. School curricula.
2. Teacher training curricula both pre-service and in-service.
3. Industrial training courses.

- Different institutions should carry out the task of EE, including:
- Educators.
- Industrial Managers.
- Health Directors.

And others who are already trained for the problems of environment.

These institutions should work hand by hand with the help of:
- T.V.
- Radio,
- News papers and magazines.

4.4.3. Pre-conditions:

People from different institutions must also have the experience of environmental problems, in order to develop the curriculum to incorporate environmental education into industrial education and to start the training with the teaching staff in a limited period and to train preservice teachers.

To incorporate environmental education into industrial education is to set or put environmental education somewhere in the existing curriculum and the new curriculum can be set when it becomes possible.

Environmental education should not be a subject to be taught separately but it must be incorporated into every subject that is taught in the schools with emphasis on the technical/vocational schools (industrial).

4.5 SUDAN: By Mr. Abdelrahman Ahmed Abdalla.

Objectives:

The following are some main objectives for incorporating EE into IE:
1. To make students aware of the environmental problems in their country as well as in other countries.

2. To give students the major principles of safety in using different tools and instruments.

3. To make students aware of the limited available resources and how to use these resources effectively.

4. To make students participate actively to protect their environment.

4.5.1. Implementation:

To achieve the above mentioned objectives we have to implement EE in all levels of the educatinal ladder and inservice and preservice training for the teachers.

It can be delivered by:
1. Incorporating EE into school curricula.

2. Training teachers for a short period of time to have the necessary knowledge and skills needed for teaching EE.

3. Training newly graduated teachers before they start teaching.

4. Incorporating EE into curricula of teacher training institutes.

Also the mass media, T.V., Radio, Posters,Newspapers..etc., should be used effectively to make the people aware of environmental problems and their impact on their lives.

To make the work for environmental problems well integrated a national committee for environment should be appointed from different sectors concerned with the issue; environmental specialists, educators, industrial sector, agricultural sector, health sector, energy sector, mining sector, T.V., radio, newspapers, and they should work together to find the best way for implementing EE.

Specialists from different educational levels in different subject areas and specialists in the environment should sit together and prepare a curriculum to be implemented in the long range. We have to start now with inservice training for teachers already in work by short period courses, also to train the newly graduated teachers for about 2-3 month training courses before they start teaching.

The best way to incorporate EE into the educational system is to add EE aspects in the existing curriculum and to think about a new curriculum in the long range. The awareness of the teachers about environmental aspects will make them able to teach their main subjects by adding to each topic, whenever possible, the environmental aspects.

4.5.2. Stages:

As mentioned before the incorporation of EE into the educational system will take the following steps:
1. Inservice training of teachers to be aware and familiar with EE.

2. New graduated teachers should be trained for a short period of time before they start teaching.

3. Incorporating EE into the existing curriculum.

4. Prepare a new curriculum for a long range change.

## 4.6 TANZANIA: By Mr. E.A.A. Massawe

Education Ladder in Tanzania and duration of each stage.

| | age | Duration |
|---|---|---|
| - Kindergarten | 2-3 Yrs. | 3 Yrs. |
| - Primary Education | 7 Yrs. | 7 Yrs. |
| - Vocation Education | 14 Yrs. | 2-3 Yrs. |
| - Technical ) Agricultural) Secondary Schools | 14 Yrs. | 4 Yrs |
| - Other Schools | 18 Yrs. | 2 Yrs. |
| i.e. Accountancy. Secretarial. Teacher's Colleges. | | |
| - A-level Secondary Schools | 18 Yrs | 2 Yrs |
| - Military Training | 20 Yrs | 1 Yr. |
| - Business College | 21 Yrs | 2 Yrs |
| - University Education | 23 Yrs | 3-4 Yrs. |

i.e. Agriculture-Sokoine University.
Other Faculties - University of Dar-es-Salaam.

### 4.6.1. Environmental Problems in Tanzania:

- Unwise use of natural resources.
- Pollution of air, water and soil. Noise in the towns and cities is a common phenomenon.
- coastal erosion.
- Desertification. EE can, in my opinion, play a very important role in solving these problems.
- In the city and Municipality, the population is growing faster compared to the provision of the essential needs, e.g. water and transport.

### 4.6.2. Inner and Outer Objectives of EE:

- Make students and trainees aware of specific environmental problems and risks that relate to the type of industry or subject of speciality.
- Protect and improve the environment and protect the students, trainees and workers against accidents and health.
- To provide adequate knowledge to technical vocational education trainees and those in technical colleges in the use of the environment for economic development and consequences for the misuse of the environment.
- To develop positive attitudes about his work and environment in his work place, home and the surrounding society.

4.6.3. Level of Education System:

- EE should be incorporated into IE (technical education) at all levels starting from the TVE, Technical Secondary Schools and Agriculture Secondary School.
- Specialized institutions have to be established to prepare experts in EE field.

4.6.4. Method of Delivery:

At the University level, in the Faculty of Engineering-University of Dar-Es-Salam, a separate subject is taught for occupational health and safety at work place.

This method could be used at all other levels, but since the technicalities of teaching it as a separate subject would be difficult, then it would be appropriate to infuse EE into other subjects.

4.6.5. Teachers Preparation:

In my opinion, at Teachers Training Colleges, EE should be introduced as a separate subject. But for those(teachers) who graduated before should be given inservice training on EE in IE and told of its importance. That is, the development of inservice training programmes to ensure rapid adaption of the current teaching processes to previously neglected EE requirements.

4.6.6. Media Uses:

Tanzania has a programme for Primary Schools on radio. The programme, however, does not include EE.

The incorporation of EE in such programmes could help a lot in brining awareness to more people.

Daily News papers could also be used to educate and mobilize the society at large on the concepts of environmental education.

4.6.7. Type of EE Curriculum:

- The Ministry of Education (Tanzania) should. in my opnion, review the curricula of Technical Schools and Institutes. The Ministry should issue a circular for emphasizing EE in IE and that EE should be explained in theoretical subjects in Technical Schools.
- Review teacher training curricula to give EE its special place in these.

4.6.8. Guideline for Content:

- National needs mast be made known - What are the resources available for economic development?
  How do industries using these resources affect one another?

- For example, students undertaking woodwork must be taught the effect of woodwork waste on the entire environment sourrounding them - and that they can use it in other industries.

4.6.9. Method of Teaching:

Since it would be difficult to introduce EE as a separate subject, it is suggested to merge the displines in the schools as far as possible.

This means knowledge specifically required by a specialized group should be provided by other specialized experts in the field if that is likely to incorporate EE in the former group.

4.6.10. Method of Evaluation:

a) Formative Evaluation:
   . Direct Observation.
     - Attitudes (Initiative)
     - Skills acquired.
     - Awareness.
     - Values.
     - Knowledge ..etc.

b) Summative Evaluation:
   . Examination
     - Oral.
     - Written.
   . Practicals.
   . Project Work.

4.6.11. Stages of Implementation:

- The Policy Makers should be made aware of the importance of incorporating EE into IE and hence appreciate it.
- The curriculum developer should also be aware of the environmental problems associated with the irrational treatment of the environment.
- As already mentioned teachers should be made to understand the technicalities of infusing EE into other subjects.
- The students and trainees of TVE, Technical Secondary Schools will be trained about EE if all the above have been fulfilled.

CURRICULUM DEVELOPMENT SUGGESTIONS

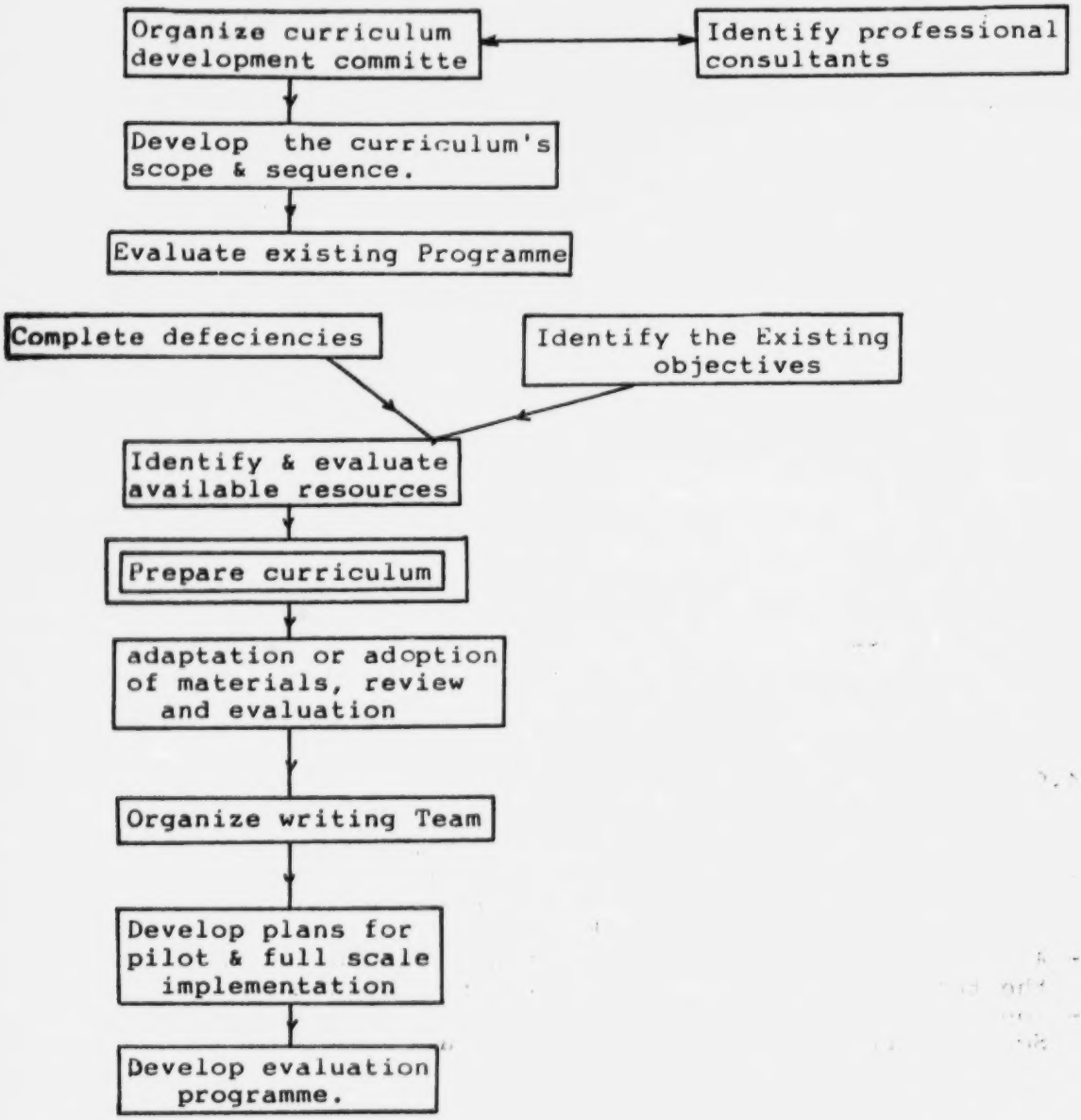

Organize curriculum development committe
Identify professional consultants
Develop the curriculum's scope & sequence.
Evaluate existing Programme
Complete defeciencies
Identify the Existing objectives
Identify & evaluate available resources
Prepare curriculum
adaptation or adoption of materials, review and evaluation
Organize writing Team
Develop plans for pilot & full scale implementation
Develop evaluation programme.

DIAGRAM SHOWING CURRICULUM DEVELOPMENT SUGGESTIONS.

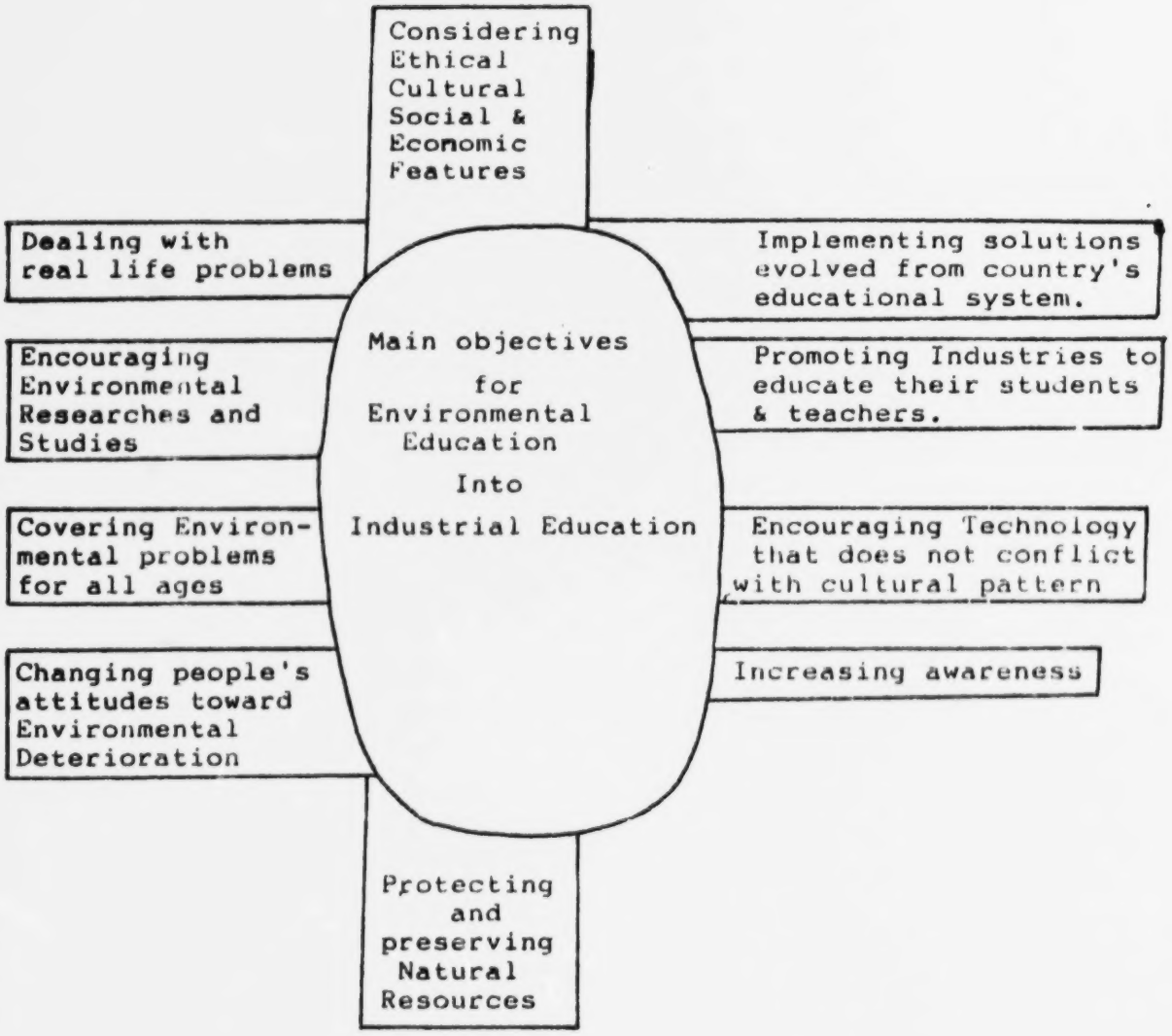

Considering Ethical Cultural Social & Economic Features
Dealing with real life problems
Implementing solutions evolved from country's educational system.
Main objectives for Environmental Education Into Industrial Education
Encouraging Environmental Researches and Studies
Promoting Industries to educate their students & teachers.
Covering Environmental problems for all ages
Encouraging Technology that does not conflict with cultural pattern
Changing people's attitudes toward Environmental Deterioration
Increasing awareness
Protecting and preserving Natural Resources

Diagram showing Main Objectives for Environmental Education into Industrial Education

## 4./. EGYPT: Prepared by the steering committe of the Training Course

Environmental education is generally accepted to fit to all stages of education in Egypt, starting from basic education to post-graduate stage. The mode of its introduction must adapt with the mental and the educational level of each stage.

The first stage in the educational ladder (8 years basic education) is covered by a general EE component. The suggested strategy is concentrating on industrial secondary schools (3 years & 5 years) which could play a crucial role in environmental protection. EE at tertiary level is also under consideration.

### I- Industrial Secondary Schools:

#### 1- Objectives of EE in I.E.:

Concerning the industrial secondary schools, the basic objectives may in general terms be formulated as follows:

a) to acquire knowledge, skills and attitudes important for the active protection, moulding and improvement of the environment in the process of each working activity.

b) to develop interest in the environmental care and ability to take a creative approach to the solution of environmental problems in any area of human activity.

c) to inculcate professional responsiblility for bearing impact on the environment in any job assignment.

d) to permeat ecological aspects into technical thinking and behaviour.

e) to facilitate the ability of the learners to take into consideration individual as well as occupational health safety precautions beside the general EE component.

#### 1 Implementation of EE in IE

To achieve the above mentioned objectives there is a pressing need for the revision of all curricula in industrial secondary schools in order to implement EE in general and technical subjects and activities.

Untill this is achieved it seems likely to incorporate EE in each subject area through the committee with adequate representation of the teachers.

The content should include a general component consisting of natural resources degradation, the resulting pollution and a specialized component covering the inner environment ( individual safety and occupational health) and the outer environment (effects of design, processes, products and by products) and alternatives for its control. Each specialization must be studied in detail to identify the specific implementation of EE.

1-3- Methods of Teaching:

The methods applied for teaching EE in IE should be broader than giving facts, theories and alternatives. The needed psychomotor skills and the attitudes leading to active participation in environment control should be the focus of the teaching methodology. The teacher should enhance student's thinking to face new situations and respond correctly to them.

1-4- Methods of Evaluation:

Evaluation should exceed mere knowledge and concentrates on observing the behaviour of the students towards the environment, problem solving, ability to find out the alternative design, process ,and products to protect the environment.

1-5- Cooperation of Agencies:

Taking into consideration the complexity of modern societies, incorporating EE into IE should integrate with the Egyptian educational agencies, the Institute of Environmental Studies and Research and the interested public and academic authorities.

There are at present several activities of Egyptian media towards realizing general environmental education objectives. The suggested strategy should articulate with these activities to reach almost every part of the country.

1-6- Stages of Implementation:

It is clear that implementation of this strategy could'nt be in one shot. Several stages could be suggested. In the first stage teacher training and curricula revision are needed, in the second stage preparation of texts and educational technology, in the third integration of M.O.E. activities with other activities, in the fourth stage general revision of the whole educational ladder curricula will be appropriate.

1-7- Actions to be undertaken:

In implementing this strategy there are some urgent actions to be undertaken.

1-7-1- Making a good model for teachers and students to follow in environmental protection.
1-7-2- Creating a public awareness towards EE.

1-7-3- Involving the industry, engineering bodies, practitioners, syndicates, labour unions .... etc. in creating the awareness and active participation in environmental protection.

In collaboration with these urgent actions a systematic planing for implementing this strategy should be studied in detail for a continuous revesion and updating of EE on a long term basis.

II- Training of Teachers:

Training of industrial secondary school teachers for the incorporation of EE in IE is a must. Pre-service and in-service training should cover both the specialized and the methodological aspects of EE.

III- Tertiary IE:

Incorporating industrial education in colleges and universities for the training of engineers, architects, and technologists is essential. Special committees of specialists in industry, environmentalists and educationlists should participate in setting the curricula for both pre-service in in-service training.

In the opinion of the writers two kinds of courses are needed. A general one for all learners covering the basic general elements and a specialized one for each specific industrial aspect giving the alternatives (alternative methods processes, designs.....etc.), that could be used to protect the environment.

## V. ENVIRONMENTAL EDUCATION UNITS DEVELOPED BY THE COURSE PARTICIPANTS

Industrial safety in the workplace may be already known to industrial workers and are readily accepted as precautions to be taken into account while designing industrial processes, but mostly for the safety of the workers themselves. Environmental precautions may be followed for the sake of safety of outsiders only in cases when legal responsibility is involved. Interest in the safeguard of plankton or soil fauna, for example, will never occur to a site manager unless he is being sensitized as a responsible citizen for the importance of such organisms in ecological stability and environmental productivity for the benefit of the nation as a whole. The following two educational units aim at inculcating such a sense of responsibility in the attitudes and behaviour of people who will eventually be charged with the management of economic resources in society, without harming other environmental resources.

### 5.1 Unit on "Constructing a family house, starting from site selection to excavation"

Target population: Secondary industrial level; Grade 12.

Duration of the Implementation: 8 months.

Prerequisites Attendants of the course must have knowledge and skills in the following fields before the start of attendance:

1- Architectural drawing blue print reading.
2- General math. background.
3- Basic knowledge of:
Chemistry, Geology, Physics and Biology.

Educational Technology Materials:

A. Models of :-

* Different site configurations.
* Survey instruments and models of their installation and use in the real site.
* Earth-moving equipments used in excavating the soil.
* Models showing the damage caused by insects and rodents.
* Models of soil testing instruments.

B. Samples of:-

* Different kinds of soils.
* Chemicals.

C. Real instruments:-

* Surveying instruments.
* Hand instruments used for earth-moving, and for simple measurements.

D. Drawing of:-

* Complete site plans.
* Site levelling.

E. References:-

* Extracts from the laws and the legislations related to building activities.

| Objectives | Activities | | Educational Technology | Evaluation | Time |
|---|---|---|---|---|---|
| | Methods of Teaching | Content | | | |
| 1- Define the terms:<br>- site selection<br>- site preparation<br>- levelling<br>- measurement<br>- testing the soil<br>- excavation | Lecturing and Demonstration | Site selection: is the process of making and investigating of site and finding its natural characteristics, giving attention to the man-made factors and the cultural factors for the suitability of site for the construction.<br>Site preparation: is the process of cleaning the site before start of the construction.<br>Levelling: is the process of finding the elevations of different points in the area for the construction.<br>Measurement: is the process of determining the boundaries of the construction.<br>Testing the soil: is the process of preparing samples from the site and testing them in the lab.<br>Excavation: is the process of digging tranches for the foundation. | Black Board<br>O.H.P.<br>Slides<br>Transparencies | Oral questions<br>written questions | 1 hour |

| Objectives | Activities | | Educational Technology | Evaluation | Time |
|---|---|---|---|---|---|
| | Methods of Teaching | Content | | | |
| 2- Identifying laws and legislations concerning site selection, and determining environmental factors<br>- Wind direction<br>- sunrise and sunset<br>- Location of the construction in respect with the area surrounding | Lecturing | Laws and legislation concerning site selection (depends on the country )<br>- site characteristics<br>A- <u>Natural characteristics</u><br>Existing vegetation, stones, wind, surface water, ground water, birds, shades, sun light, terrain features, hardness zone.<br>B- <u>Man-made factors</u><br>Style of buildings, other buildings walls, pathes, fences, walls, swimming pools, fountains-clubs, existing lighting.....etc.<br>C- <u>Cultural factors</u><br>Power lines (above or below ground level) - telephone lines - water lines - historical features - neighbours- roadway - transportation -off-sight nuisance -zoning regulations - water supply systems -sewage-departmental stores. | Black board<br>O.H.P.<br>Slides | Oral questions<br>short quiz | 1 hour |

| Objectives | Activities | | Educational Technology | Evaluation | Time |
|---|---|---|---|---|---|
| | Methods of Teaching | Content | | | |
| 3- Prepare the site for constructions and determine the effects of:<br>- insects and rodents<br>- hard objects<br>- Explosive objects<br>- Contaminated materials<br>- Expected natural hazards. | Lecture practical work | To prepare the site to be ready for construction includes the following:<br>1- To clear the site from hard objects. In this case, attention should be given to the safety precautions of the instruments used.<br>2- Hard objects cleared from the site and plants are sometimes burned. In this case attention should be given to explosive effects of the fire.<br>3- Giving information about natural hazards such as: Earth quakes and heavy rains.<br>4- To be aware of contaminated materials, use of masks and gloves.....etc. | black board<br>O.H.P.<br>Slides<br>Field visit | Oral question<br>Short quiz<br>Assignment to write a report after visiting a given site determining the effects of mentioned statements in the objective | 2 hours<br>45 |
| 4- Do the levelling of the site | Lecture demonstration | Methods of levelling:<br>a- Direct differential or spirit levelling.<br>b- Indirect or trigonometric.<br>c- Stadia levelling.<br>d- Barometric levelling.<br>In this level the direct differential levelling will be used.<br>- The instruments used in levelling, which if called, should be shown to the student and main parts will be studied by the students.<br>- The students will go to the field work and practice how to use the instruments. | Black Board<br>Slides<br>Levelling instruments | Oral questions<br>check list for using the instruments | 1 hour for theory<br>2 hours for practical |

| Objectives | Activities | | Educational Technology | Evaluation | Time |
|---|---|---|---|---|---|
| | Methods of Teaching | Content | | | |
| 5- Measure the site for construction | Lecture<br>Demonstration<br>Practical work | Different tools used for measurement should be studied.<br>1- Taping - Direct measurement of distance with:<br>a- Steel tape<br>Length 3 ft (1 m) to 1000 ft (300 m) graduations in feet, tenths, and hundreds or m, decm. cm, mm<br>b- Engineering chain<br>100 ft long - composed of 100 links, each 1 ft long, at every 10 links brasstags are fastened.<br>c- Surveyor's chain. | Black board<br>O.H.P.<br>Tapes<br>Chains | Oral<br>question<br>short quiz<br>Practical exercise | ½hour theory<br>1 hour practical work |
| 6- Do the technical work concerning testing the soil and state the effects of chemicals in the soil on the general hygiene and strength of the building. | Lecture<br>Lab.work | Mechanical behaviour of soil (investigation of deformation) strength, sampling. Using the loading machine observe the state of stress, the state of strain, pore pressure description for different kinds of soil loading apparatus and tests performed by them. Briefly demonstrate triaxial direct shear box and oedometer tests.<br>- Testing soil texture and soil pH.The effect of soil texture on the general hygieneand strength of the building. | Black Board<br>O.H.P.<br>Testing apparatus<br>Sample of the soil | Oral quiz<br>Check-list<br>report | 1 hour theory<br>2 hours Lab.work |

| Objectives | Activities | | Educational Technology | Evaluation | Time |
|---|---|---|---|---|---|
| | Methods of Teaching | Content | | | |
| 7- Differentiate between different types of tools and instruments used for excavation and follow the safety precautions in using tools and instruments and materials. | Lecture<br><br>Field visit | Excavation is the process of digging a trench for the foundation of the construction. This can be done manually or by machinery. For small constructions we use a manual procedure. In this we should give great attention for the following environmental factors:<br>- Check the workers not to have diseases which may be transfered to others.<br>- The availability of workers'needs, like water, toilets.....etc.<br><br>For stable soil we just dig the trench. but in the case of sandy soil we should prepare shutterings to prevent soil from moving down to the foundation. Shuttering invst. be safe. Foundation digging should be made wide enough to facilitate workers movement. In case of machinery utilization, environmental factors as noise, tool hazards, gases and oils,....etc, should be avoided. | Black board<br>O.H.P.<br>Slides | Oral quiz<br><br>Check list | |

Evaluation:-

By the end of this unit; the evaluation of the student will be carried out by the following means:-

1- General written examination 1 hour
2- eneral practical examination 2 hour

General written exam. should contain:

1- Objective Questions
   A. Multiple choice questions,
   B. True-false questions.
   C. Matching questions.
   D. Short answer questions.
2- Essay questions. (giving reasons, explanations,discussions).

Teachers guide

The main objective for teacher training are:

1. Giving knowledge in the area; the teacher have to get enough informations related to the technical subjects.
2. Giving methods and skills required to teach the subjects effectively.
3. Incorporation of the skill and knowledge with the field site.

contents suggested for the training:

1. General concept of the environment.
2. Ecology & ecosystem, atmosphere, Man & environment interactions.
3. Environmental quality control, legislations & standards.
4. Safety precautions in using tools, instruments and chemicals.
5. Air pollution and contamination.
6. Water pollution.
7. Industrial visits.

educational Methods:

choosing the educational methods depends on the nature of the topics

1. Lectures for giving knowledge & discussion.
2. Field visits.
3. Practical training and report preparation.
4. Films & slides.

The preservice training programme should contain all these educational methods, together with the technical knowledge incorporated with environmental education, The inservice training programme needs less effort in teaching educational methods and its main concern should concentrate on giving knowledge and skills to help in teaching the new scientific and environmental subjects.

Educational Aids

The main educational aids are:

1. Transparencies for O.H.P.
2. Slides & films.
3. Models.

Slides showing:-

* Different sites.
* Wind direction effect.
* Sun-rise and sunset.
* Location of the structure with respect to the other ones.
* Hard objects hazards.
* Explosives hazards.
* Different tests.
* Excavation tools and their use.
* Survey tools and their use.

Films of:-

* A decision of site choice.
* An operation of surveying
* An operation of planning.
* An operation of excavation.

Industrial safety measures:

Posters

* For the explosives hazards.
* For natural hazards.
* For tools hazards and chemicals hazards.
* For process hazards.
* For the hazards of the testing instruments.

Foils for the O.H.P.

For all the above contents.

Black Board:

References:

1. Introduction to Surveying.
   Anderson and Mikhall.
2. The mechanics of soils.
   J.H. Atkinson
   P.L. Bransby.
3. Land conservation and development.
   Steiner Van Lier.
4. Landscape Book.
   Jack E. Engels.

5.2. Unit on: Waste Management in Wood-work.

Class: Grade 11 Pupils Manual
Time: 10 periods

Rationale

The learner is expected to produce industrial articles out of wood. In the process of this activity one will be exposed to the environment in various ways. One is expected to make use of the living world of woody plants in order to extract his raw materials. In so doing a lot of life other than the wood target is destroyed. Animal life and the learner as well are equally exposed to danger. In reading through this unit attempts will be made to guide the learner

to harvest his products but as well conserve the environment. The aim is to produce sawn timber but the unit ensures that measures are taken to minimise danger and to avoid waste of resources.

definition of terms.

Management is rational utilization of the environment.
Waste is the unwanted by-products of a specific industry or industrial process.

Uses of wood and Forests

The trees have leaves, bark and roots which are not normally used in wood-work. The leaves may fall down and rot giving humus necessary for plant growth. The smaller trees branches and the bark could be used as fuel in places where gas, kerosine or hydropower are not available. Certain trees have parts which are used as medicinal herbs to cure various diseases.

Activities!

Write down the table below and complete it as you identify different woods and their uses. This will require that you ask many questions in homes and along your nature walk.

Uses of wood as identified by student

| | Name of the tree | Hard wood | Soft wood | Executive furniture | Ordinary furniture | Ornamental | Medicine |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |

Sub-unit 1 Uses of wood

different types of trees and their uses:
Tree Species: There are many kinds of trees in nature.

Some forests will have one type of tree while others will have different types mixed. Usually several trees of the same type will be found together in a mixed forest.

In woodwork, one requires mature strong trees. they should be easy to cut through in order to create appropriate patterns.

Soft woods are easy to cut through but they can easily be broken. The hardwoods make beautiful natural patterns but are difficult to work with. Hardwoods are also scare and therefore more costly.

Sub-unit 2: Methods of cutting trees:

In a planted forest trees will be of uniform age and nearly of uniform size. If one tree has to be cut then choose from the edge so that its fall does not destroy other trees. If several trees are to be cut then start at the forest edge and move inwards. Care should be taken that falling trees do not harm standing or fallen woods.

After cutting the trees the logs should be removed and the site prepared for re-afforestation. If this site is left unused usually nothing may grow for a long time. Since the ground is clear, heavy rain may start off the process of erosion.

In a mixed tropical forest, this method is destructive. Only a few trees may be of desired age and size. Smaller trees and less useful ones get destroyed in the process of lumbering as a result. The habitat of many animals is destroyed. Trees that are destroyed could be put to less desirable uses such as fuel generation or building. Usually the tropical forest will regenerate if left undisturbed. the trees however take a long time to grow. So choose carefully before cutting the trees.

cutting trees in mixed stands:

Selected felling has little harm on the habitat. The tree will soon be replaced by younger ones. If reafforestation coccurs elsewhere, replacement is soon realised.

Watch out for snake bites, bee and other insect stings. If these occur, be sure to receive immediate medical attention.

activities:

1. Look for a sizable tree in the locality and list possible uses for it to justify its cutting. Seek relevant authority to cut this tree and cut it.
2. Observe a professional cutter of wood at his job. List the events before and during the cutting of the tree in order.
   What precautions does he take to ensure maximum safety for his tools, lives, and other property?

Sub-unit 3: Treatment of wood:

Preparing wood for sawing:

after a tree is cut or felled it is normally transported to a treatment point either by lorry or train. The tree will be cut into planned lengths for different uses.

a) First the tree bark will be removed. The bark can be set aside to be used for fuel or it can be put under destructive distillation to produce useful acids. Some tree barks can produce juices useful in colouring materials (dyes) or in making, wax, rubber, etc.
b) The debarked log will then be left to dry under shade so that the tree does not shrink or bend when articles are made. Sometimes a tree is placed in water for a number of days so as to remove excess sugar found in most trees. Proper drying then follows under shade. Drying also ensures that the tree does not rot or grow fungi.

Other methods of drying like using hot treatment or electrical heat can be applied but they are not economical or locally available.

Activities:

1. List the methods of treating wood.
2. What is the most common method of drying wood in your country?
3. Carry out an experiment to remove sap from the tree bark using a technology best known to you. Write down the process and give your conclusion.

Sub-unit 4 Wood Sawing:

Sawing involves actual cutting of wood to appropriate pieces. The most common tools, used here include a hand saw, or a power saw, a wedge, and a hammer.

There will also be a deep pit usually deeper than a man's height and about four meters long.

The log is placed along the pit. Sawing is a team work between two people. One man gets in the pit while the other is on top of the log. The cutting line is found using the guidance of wedges. The see-saw then is moved up and down between the hands of the two men till the log is split into appropraite sizes. Further subdivision produces more pieces.

The sawing pit can be a dangerous landmark to livestock and human beings. It should be built in a less frequented place and be clearly protected in order to avoid accidents.

People working in the pit should take care so that pieces of wood do not fall inside the pit. The tools should

be well stored after use to avoid accidents in the pit. Sawn timber should be carefully kept away.

Saw dust and its uses:

Sawing yields a lot of dust. Many people leave the dust to be washed away by rain and wind.

Self-Assessment question:

Is this good use of saw dust?

sawdust is wood in dust form. This can be gathered into bags and be a base for alternative industry. This will include paper and pulp, press wood, chipboard, briquettes for fuel. Saw dust can directly be burned to keep homes warm and to cook. It could also be used in covering disposal sites as it will float. Another alternative use is to use it to produce gases and liquids through the method of destructive distillation.

Harmful effects of sawdust:

Many saw millers throw their sawdust into rivers where it floats preventing natural circulation of oxygen. Then gradually the dust ferments. This has detetrions effects on aquatic life. Sometimes large amounts of sawdust are thrown into small rivers. They then chock the streem.

Heaps of sawdust in forests and along roads destroy the beauty of the countryside. When burnt, a lot of carbon dioxide and ash is generated. Sawdust interferes with the breathing and the eyesight of the saw millers, Heaps of sawdust in a forest are a likely target for the start of forest fires.

Sawdust is a big waste product of the wood industry with proper management it goes a long way to provide a base for other useful industries.

Activities:

1. Find out if there are any saw millers nearby.
   - Can you count how many trees a miller cuts to pieces each day?
   - Find out his source of supply.
   - What sizes does he cut them into? write down measurements.
2. Who are the major customers of the saw miller? To what use do they put the wood?
3. Approximately how much sawdust is produced at saw millers per day?
   - What are the common used for saw dust?
   - How is excess sawdust disposed of?
4. Suggest and design a possible sawdust-based industry in your locality.

5. Suggest methods you would use to stop a forest fire where sawdust is plentiful.
6. Suggest possible ways for using the forest for sustainable development.

## A TEACHING LEARNING MANUAL ON WASTE MANAGEMENT IN WOODWORK

### HOW TO USE THIS MANUAL:

The materials given in this document consist of the teachers guide, pupils manual and a list of illustrations.

The teachers guide is to help the teacher go through the work in a specified time. He is teaching woodwork but at the same time incorporating environmental education in his study. A number of other books exist that he may refer to. The guide suggests activities for pupils. These are not the same as the ones in the pupils manual. The teacher will be free to vary them. Relevant illustrations have been suggested and the teacher should place them at an appropriate place.

The pupils manual is meant for the learner to study and get some concepts about the environment in woodwork. The pupil will be able to go through the text on his own but with the help of the teachers lessons. He will do so even in his own time. This is to supplement the learning and teaching given by the teacher.

### TOPIC: WASTE MANAGEMENT IN WOODWORK

CLASS - GRADE 11 teachers guide
TIME - 10 periods

Objectives

At the end of the unit, the learner should be able to:

* enhance his productive and conservationist capacities for sustainable development,
* develop environmental awareness,
* manage waste in an appropriate way,
* and take safety precautions in his working environment.

Definitions:

Management is rational utilization of resources. Waste is unwanted by-products of a specific industrial process.

Rationale

The purpose of this topic is to introduce the learner to the environment through the learning of his regular subject. The environment does not exist independent of our lives. Our work is part of it. As the learner makes individual progress to produce an article he should become aware that he is affecting other parts of the environment by producing waste.

The waste should be appropriately managed in order to reduce costs of disposal and dangers to other users. The learner in industry should cautiously become aware of safety precautions in his trade. This industry is taught and a trade developed but in addition to that he should acquire an appreciation for his environment. Without this he should not be able to develop and manage his surroundings.

Class visits:

1. Plan the lesson.
2. Make a pre-visit to the place and give the authorities details of your expectations.
3. Prepare the schedule for the visit and discuss it by: questionnaires and with pupils interviews, checklist. Prepare to explain shortfalls in the field.
4. Prepare teaching aids.
5. Organise students in groups and asign specific tasks to the groups.
6. Seek permission from school authorities.
7. Take pupils out for the visit.

This schedule could be used for visits to the forest, to the saw mill and to the log treatment plant. The teacher should make relevant adjustments as need arises.

Picture accordion

---

Pupils and teachers should assemble a list of pictures from newspapers and magazines using the same description as for slides

---

Experiments and Projects:

1. Have a pond dug in the school compound or set up an aquarium. Put some sawdust into the aquarium or pond. Observe the behaviour of the fish for a number of days. Write down the conclusion.

2. Destructive distillation.
Ask the physical sciences or biological sciences teachers to set up an experiment using sawdust, see original.

Slides Cutting Trees:

1. Cutting trees in an equatorial forest by selection.
2. Impact on other plants and animals.
3. Collecting wood and waste for other use.
4. Replanting forest or forest margin.
5. Impact on environment.

Alternatively pictures and newspaper cuttings could be assembled and made into a picture accordion.

Treatment :

The teacher will provide a small log of wood. This is to be used to demonstrate debarking of the tree.

## Appendix A.1

## Timetable of Work

**Sat. 12 Nov.**

| | |
|---|---|
| 11-2 | Informal meeting at Egyptel Hotel |
| 1 | Briefing by Dr. Abdel-Ghafoor Ghaznawi, UNESCO, Paris. |
| 2 | Acquaintance and discussion of programme with Organizing Committee and staff members of the Seminar. |
| 12.30 | Opening Session at University of Ain Shams (Zaafaran Palace). |

**Sun. 13 Nov.** Industry Needs of Resources

| | |
|---|---|
| 9-10 | Environmental Education & Its Incorporation into Industrial Education |
| 10-11 | The Ecosystem |
| 11-12 | Biotic Resources |
| 12-12.30 | Break |
| 12.30-13.30 | Mineral Resources |
| 13.30-14.30 | Energy Resources |

**Mon. 14 Nov.** Industrial Impact on Resources

| | |
|---|---|
| 9-10 | Water Resources |
| 10-11 | Hazardous Wastes |
| 11-12 | Air Pollution |
| 12.30-13.30 | Water Pollution |
| 13.30-14.30 | Industrial Education for a Better Environment |

**Tue. 15 Nov.** Medical Impacts

| | |
|---|---|
| 9-10 | Chemical Impact on health |
| 10-11 | Physical Impact on health |
| 11-12 | Periodical Medical examinations |
| 12-12.30 | Break |
| 12.30-13.30 | Health Service in Industry |
| 13.30-14.30 | Discussion |

**Wed. 16. Nov.** Envirnomental Education

| | |
|---|---|
| 9-10 | Environmental Education |
| 10-11 | Industrial Education |
| 11-12 | Environmentally Oriented Industrial Education |
| 12-12.30 | Break |
| 12.30-13.30 | Building Teaching Units |
| 13.30-15.00 | Job Assignment |

**Thu. 17 Nov.)**
**Fri. 18 Nov.)** Educational Field Trip to Alexandria

Sat. 19 Nov.

| | |
|---|---|
| 9-10 | Country Reports |
| 10-11 | Experiential Group Work |
| 12-12.30 | Break |
| 12.30-13.00 | Plenary Discussion |
| 13-14.30 | Case Studies |
| 17-20 | Experiential Group Work (Continued) |

Sun 20 Nov.

| | |
|---|---|
| 9-12 | Experiential Group Work ( continued) |
| 12-12.30 | Break |
| 12.30-13.00 | Plenary Discussion |
| 13-14.30 | Experiential Group Work ( continued) |
| 17-20 | Experiential Group Work ( continued) |

Mon. 21 Nov.

| | |
|---|---|
| 9-12 | Experiential Group Work ( continued) |
| 12-12.30 | Break |
| 12.30-13.00 | Plenary Discussion |
| 13-14.30 | Experiential Group Work ( continued) |
| 17-20 | Experiential Group Work ( continued) |

Tues. 22. Nov.

| | |
|---|---|
| 9-12 | Experiential Group Work ( continued) |
| 12-12.30 | Break |
| 12.30-13.00 | Plenary Discussion |
| 13-14.30 | Experiential Group Work (continued) |
| 17-20 | Presentation of the units |

Wed. 23 Nov.

Educational Field Trip to Iron & Steel Complex in Helwan and its Technical Schools.

Thu. 24 Nov.

| | |
|---|---|
| 9-12 | Study of the Draft Final Report. |
| 12-12.30 | Break |
| 12.30-13.30 | Closing Session. |

## A.2 Opening Session Speeches

### A.2.1 Speech delivered at the Opening Session by Prof. Mohsen Tawfik Dean, IESR

Ladies and Gentlemen,

If the age of the earth is estimated at 4,500 to 6,000 million years, and the age of life on earth, in its simplest forms, at 1,500 million years, and mamalas at 150 million years, the most eventful part of history is undoubtedly the 20th century.. and let me say its second half. This century has witnessed fascinating events. At its beginning, human population was about 1,600 million people. At its end this number will have quadrupled. So what? The earth is still the same.Water has not increased by a single drop since creation, arable land is almost the same, no clean air has come from outer space. The earth is still a suspended fleck in space revolving around the sun, receiving its life-supporting rays.

While humanity wrestled with nature, it developed technology to subdue the elements. However, human society has forgotten that it can only act through laws of nature. Think of air conditioning. It can cool the air of your room, but what about the air outside? and what about the minerals and the energy needed for it? and what about the exhaust gases of our machines? Increased atmospheric temperature may cause 20-120 cm rise of sea level in the years 2020, thereby inundating large sea ports and important agricultural food-producing areas. This industry is our target. It absorbs large quantities of resources and spews out large quantities of wastes which pollute the environment and poison or annihilate life.

Only one way out is available, and that is education. An education that teaches the facts of life and not only the findings of science. An education that works towards a new culture compatible with the environment.

If environmental education is necessary for all of us, it is a must for industrialists. Its place is both in school and in the factory. Its methods are curricula and audiovisual aids. This is why our Training Course will attempt to answer one vital question: How to incorporate environmental education into industrial education? Participants from the Arab and African countries present here are requested to answer this question through two weeks of hard work, together with a selection of experts. They are requested to produce models of such programmes that they will build themselves and bring back to their countries for application and implementation.

It is a great pleasure for IESR to join in such a global effort supported by all the countries of the world. When representatives from Arab and African countries meet here, this is noteworthy, because these are countries of immense natural resources and great established civilizations. Their meeting here is not merely for discussions, but rather to reach cencrete models for practical application.

Please join me in welcoming our dear guests. Please Dr. Ghaznawi, great friend of humanity, my sincere thanks for your kind collaboration with us. Please also let me thank our National UNESCO Commission, its distinguished Secretary-General, and its Asst-Secretary-General, Mrs. Soad Abdel Rasool, a fine example of the highly educated and alert Egyptian woman.

I also am honoured to thank Dr. Ahmed Fathi Sorour, Minister of Education, for his support for the activities of our Institute and I do ask God the Almighty that He help him in the most difficult mission undertaken by an Egyptian Minister given the responsibility of the future of this nation. His presence here is a great indication of his personal interest and encouragement for our efforts and for laying down the principles of environmental education.

I hope that we will all here arrive with our common endeavours to the good of our peoples and of humanity at large.

A.2.2. Speech delivered at the Opening Session By Dr. Abdul Ghafoor-Ghaznawi, Unesco, Paris

Your Excellence, Prof. Fathi Sorour, Minister of Education,
Your Excellence, Prof. Al Hashimi, President of Ain Shams Univ.
Prof. Vice-President of Ain Shams University,
Prof. Mohsin Tawfik, Dean, Institute of Environmental Studies & Research,
Distinguished Colleagues,
Ladies and Gentlemen,

It is indeed a privilege for me to welcome you, on behalf of Unesco, to the Afro-Arab Training Course on the Incorporation of Environmental Education into Industrial Education. This Course is organized by the Institute of Environmental Studies and Research of Ain Shams University in cooperation with Unesco-UNEP International Environmental Education Programme. The Course is conceived in the context of Unesco's Programme and Budget for 1988-1989.

The objectives of the Course are to familiarize participants with the development of environmental education (EE) and its

need and place in technical and vocational education, to develop guide-lines for the incorporation of environmental education into industrial education and to enhance exchange of information and experience in this field.

Environment and environmental issues have become the subject of concern in contemporary society. This is so because now we know more that humanity depends on the environment for food, shelter, air, water, medicines and leisure. Furthermore, humanity depends on the environment for essential resources for all types of developments in order to satisfy the increasing demands of the life-styles in vogue in contemporary civilization. Humanity's dependence on the environment and its resources come into sharper focus if one considers the increase in world population which was 3.066 billion in 1960, 3.696 billion in 1970, 4.066 billion in 1975, 5 billion in 1987 and with the possibility of surpassing 6 billion in the year 2000 and 8 billion in the year 2025. The increasing world population and their needs and demands have to become compatible with environmental resources of the planet not only at present but in the future as well. The decisions of the present generation of humanity with respect to the environment will not only affect them but it will make them responsible to future generations as well.

In the process of satisfying our increasing daily needs and the needs of our development projects we take all of our needed resources from the environment and in turn we return waste to the environment. Industry makes this process faster.

Industry on a small or large scale is a reality of everyday life in the developed and developing countries. Every industrial undertaking needs energy and resources which are taken as raw materials from the enviornment. The quantity of these raw materials, the ways they are taken or extracted from the environment and transported to the site of industry, storage techniques before processing, the processing mechanisms and methods, the final products and its storage and distribution, the waste products and the methods of their storage and disposal, all have direct environental impacts and consequences. Poor planning and/or small negligence in any stage of industrial enterprises may have disasterous results. Examples are the Bhopal tragedy in India with about 2,000 persons dead and the Chernobyl disaster (costing 8 billion roubles) and several other accidents of poisoneous gas likage, into the air or discharge into river or sea resulting in loss of life and financial costs. Sometimes the industrial wastes accumulate together and after a certain period causes global environmental problems that become the concern of the whole human family not only at present but in the future as well. A concrete example is the contribution of industry

in the increase of carbon dioxide ($CO_2$) in the atmosphere with its greenhouse effect resulting in the increase of temperature in the atmosphere which could in turn lead to the rise in the sea level with possibility of flooding the shores where most cities, industries and business are found. Similarly, the rise in the temperature of the atmosphere may shift the rain belt of the planet. If the shifted belt zones do not have fertile soil for appropriate agriculture, one can easily imagine far-reaching consequences of global shortages of food for the present and future generations. Another global environmental problem with industrial origins is the depletion of ozone layer due to excessive use of CFC (chlorofloro carbon) that could result in more skin cancer and possible impacts on the process of photosynthesis. The last global environmental problem that I refer to industry here is the acid rain mainly caused by industrial emissions which has already resulted in a wide deforestation and in the disappearance of fish in several lakes in Europe.

Industry is a neutral process or undertaking. Its environmental impact depends on how carefully industry is planned and executed. Certainly the responsibility of planning and execution of industry with its environmental consequencies lies on the industrial decision makers, engineers and the skilled and semi-skilled technicians and the industrial labour force.

It is hightime to examine the pre-service and in-service training of the above industrial worksforce and make every effort that environmental sensitivity, awareness, knowledge, skills, attitudes, commitments, civic actions and ethical responsibilities become an integral part of the personality in industrial manpower. This can only be achieved through needed education. Thus, the need and the opportunity for the renewal of industrial education at pre and university levels. This is the reason and justification for the preparation and organization of this training course with due focus on pre-university industrial education whose large target groups will affect the indoor and outdoor environment with their everyday decisions and actions.

The methods of work in this course involve presentations and discussions by experienced scientists and educators provided by the Institute of Environmental Studies and Research presentation and discussion of country reports and preparation of prototype materials by participants who could examine them for local adaptation and use upon their return to their respective educational institutions. Educational field trip and visit to educational institution are also on the agenda.

Ladies and Gentlemen,

This is the first environmental education activity which Unesco supports in the Afro-Arab context. Future activities in this context will very much depend upon the satisfactory results that may be achieved and the needs that may be expressed. I must add that Unesco has collaborated with Ain Shams University in the development of several environmental education activities. It was in October 1987 that the Faculty of Education of Ain Shams University organized, in cooperation with Unesco, the International Consultation Meeting on Developing Non-formal Environmental Education. Unesco supported a National Training Seminar on Environmental Education for Teachers of Religious Schools organized in early 1988 by the Institute of Environmental studies and Research of Ain Shams University. Unesco is also concluding a contract with the National Education Research Centre of Egypt on the preparation of two prototype documents with regional perspectives, namely "An Environmental Education Dimension of Curriculum for Primary Schools in the Arab States and "An Environmental Education Dimension of Curriculum for Preservice Training of Primary Teachers in the Arab States.

Ladies and Gentlemen,

On behalf of Unesco, I thank the Government of Egypt for accepting the organization of this Afro-Arab Training Course in Cairo. I want to thank the President of Ain Shams University for facilitating the organization of the Course by the Institute of Environmental Studies and Research. Our thanks go to Professor Mohsen Tawfik, and his task force for the preparation of the Course. I express my deep appreciation to Member States for sending their respective participants whose efforts in the preparation and presentation of country reports will enrich the seminar.

Unesco looks forward to the efforts of the resource persons and the participants in making the course a beneficial training exercise especially through the development of prototype materials which could be considered for local adaptation and use in the context of industrial education in the participating Member States. In this, I wish the organizers and the participants of the course every success.

Thank you

## A.2.3. Welcoming Speech by Prof. M. El-Hashimy President, University of Ain Shams

It is my pleasure to announce here and now with the help of God the Almighty and thankfully to him the opening of the Afro-Arab Seminar on the Incorporation of Environmental Education into Industrial Education, organized by the institute of Environmental Studies and Research of this University, in collaboration with the International Environmental Education Programme of UNESCO and UNEP, and which will continue till the twenty-fourth of November, with God's will.

This seminar is held at a time when our societies are beginning to take consciousness of environmental problems and are becoming aware of their dangers - not only to the future of development, but also to the future of human life on earth. Our societies are looking helplessly to problems of pollution, of land degradation, to depletion of resources. But they are also fearful now of problems of the ozone hole, the transfer of nuclear and toxic wastes, the greenhouse effects, and do not know whether there are real solutions for such problems. People do not know if these problems will continue to escalate and lead to the evential destruction of mankind, or that at some unknown point a miracle will happen and wipe off all these harmful effects. Of course, we should not expect to continue poisoning our environment and wait for a miracle. If we are responsible for pollution and for degradation of the environment, we only have the responsibility of finding solutions to these problems and to modify the course of our activities so that disasters could be averted.

All human activities cause environmental degradation. In fact, it is a characteristic of all living things to destroy other components of the environment in order to maintain life. But what is destroyed by one organism is used to maintain the life of another organism. This is the natural equilibrium which ruled over the earth for several millions of years. And this is what our ancestors understood when they dealt with nature as farmers or as herders. They were keen on keeping the balance of nature intact, so that they could live in harmony with it, and could deliver it fit for life for their children and grandchildren.

But this balance of nature was suddenly disrupted with the Industrial Revolution of the 19th century. Man Started to use fossil fuels such as coal and petroleum, and to use huge mineral reserves of iron, tin, aluminium etc., to satisfy growing human needs and rising expectations, first in the developed world, and later in the developing countries. While

our ancestors used only the resources of their own regions. Man in the industrial age is using resources from anywhere in the world. In this way, there is very little regard to local effects of resource depletion on environmental degration. Industry is therefore accused, and I am afraid reghtly so, of being the most destructive human activity towards the environment. It absorbs great quantities of raw materials, it produces great quantities of waste material, it produces also great quantities of poisonous substances that sneak into our waters, our atmoshpere, and our food.

Your presence here to discuss methods for the incorporations of environmental principles and concepts into industrial education, from school to university, is in my opinion, a very important step towards reducing the negative effects of industrial activity on the environment. The industrial man, whether a simple worker or a research engineer, must be well aware of the impacts of his activities on the environment and on human society in general. He must be conscious from within his own education about these impacts. He must not wait until he is told about them by an outsider, or be imposed upon by a law which he does not appreciate. This is the message of your work during the coming two weeks. How to make the engineer or the worker self-sufficient in environmental awareness and how to make them appreciate the importance of environmental regulation in industrial activities.

To all of you the very best wishes for a worthwhile venture and a happy stay in Cairo.

A,2.4: Opening Address Speech by H.E. Dr. Ahmad Fathi Sorour Minister of Education:

It is my privilege and special pleasure to welcome you to this seminar on Incorporation of Environmental Education into Industrial Education, that addresses the difficult, and yet vital topic of the relationship between environmental well-being and industrial development, and the special role of industrial technicians in our modern society.

As we know, industrial development of any country is both the key and the motor to its overall development in all walks of life. It is the guarantee that its natural resources will not be sold in international markets as mere raw materials, but as finished products which have their intrinsic value added thanks to the efforts of its well-educated citizens. Industrial development therefore is also a guarantee that the general level of education and of awareness for all citizens is raised to higher levels. This is certainly why all developing countries, once they obtained independence, embarked

on ambitious plans for rapid industrialization. And this happened at time when environmental considerations were not yet regarded as an essential component of development.

In the past decades, our country has realized great advances in the fields of traditional industries, such as textiles, and agro-industries, as well as in modern industries such as iron and steel, chemicals, cement, porcelain, paper, fertilizers, oil refineries, and many others. It was also possible to strike a balance between the imperative of producing for the sake of exportation, and the imperative of producing to satisfy the basic needs of the Egyptian citizens. In many industries, we now export only the surplus after having realized self-sufficiency of many industrial products. Yet, our industrial productivity is still short of our requirements, and there is room for a greater contribution of industrial production in our overall economy. And here comes the crucial of industrial education.

In Egypt, our basic principle is that education is an original right for every citizen, and that it is the natural prelude for the success of any development effort, and here I mean comprehensive development: economic, social, and political. From this, the state has adopted careful scientific planning as basis for the take-off towards the future, by preparing a stock of man-power at the highest possible level of skills to meet the needs of society. Thus the state is expanding the education base and diversifying its options. All education is free, and admission is subject only to quality of applicants, to the highest possible university degrees. Education in our concept is not just teaching skills, however, we are interested in religious morals and in instrilling national values, and are offering all kinds of services for the sound comprehensive development of the personalities of our students. New kinds of schools for technical and vocational education are being set up everywhere in Egypt, and new colleges and faculties for specialized areas of engineering professions are set up in our universities. The aim of these new educational establishents is to allow our students to obtain the best and the most advanced technical knowledge, something which we consider essential for the success and sustainability of our development efforts.

These new trends in our national policy for technical and vocational education is part of the new revolution in our educational policy as a whole, in order to meet the challenges of the coming twenty-first century. However, we are confident that technical and vocational education, and in particular industrial education, must not lose sight of the fact that the environmental dimension has become part

of the social responsibility of every citizen. The engineer and the worker both have a greater share in this responsibility, than the ordinary citizen, since it is they who change the face of the earth with their mines, factories, products, roads, and other forms related to their industrial production activities. The incorporation of environmental education into our schools and universities has been our pre-occupation for many years, and I am now glad that your Seminar will deal with industrial education in particular. This is most welcome, and we look forward to the outcome of your deliberations. This issue that your Seminar will discuss, and educational experiences from the friendly countries which you represent, contain valuable information, that your Seminar will review and that we will certainly use as guide-lines for future improvements in our educational system, in our region, for a better and more harmonious relationship between man and his environment.

To you all the very best wishes for reaching constructive recommendations in this respect.

## A.3: CLOSING SESSION SPEECHES

### A.3.1 Closing Session Speech by Prof. M. Tawfik, Dean, IESR

Dear Dr. Ghaznawi,
Most Honourable Mrs. Soad Abdel-Rasool,
Representative of the Egyptian National UNESCO ommision
Dear Participants of the Training Course,

I find it difficult after the intensive collaborative that we did together for the past two weeks, to say goodbye. More than two weeks ago you started arriving in Cairo and from that moment work seriously was begun for every person and for each group. But for several months before that we, here at IESR, were bent on our preparatory work looking forward to the moment of take-off when we would all meet together in one room and at the same moment. We were indeed fortunate that our invitations for participation in this Course were responded to by seven Member States, which is exactly the number that was originally envisaged by UNESCO and ourselves. These were from Arab and African countries: Irak, Sudan, Somalia, Ethiopia, Kenya, Tanzania and Nigeria, in addition to Egypt. We were also fortunate that another participant from Kuwait joined us so that we have nine participating countries from the Afro-Arab region, which we consider an honour and a success for our Training Course.

We started this Training Course with a number of intensive lectures followed by discussions. The aim was that participants get to know each other and to acquire similar levels of environmental information, from the point of view of ecological systems and natural resources, as well as the impact of industry on these and on human health. Thus it was necessary to consider environmental education as one important approach towards implementing solutions for environmental problems and to incorporate it into industrial education which brings forth to society all those workers in indsutry and those who are ultimately responsible for the health of our human environment, for its survival, and for attaining the goal of sustainable development.

It was appropriate to benefit from our expertise at Ain Shams University, which extends now for more than 15 years, in the field of experiential education, which has proven its efficiency and effectiveness. The second part of the Course therefore was the division of participants into groups which acquire, through the formulation of educational modules in industrial education, built on the bases of environmental education, real life-like work experience

that can be transferred to their respective home countries. This experience about methodology for the formulation of teaching units would therefore be acquired by active participation and not merely through attending lectures. The Course was crowned by suggested strategies from each participant, about incorporating EE into IE in his/her own country.

The Egyptian government accorded their utmost attention to the Course, for it was inaugurated by H.E. the Minister of Education and the University of Ain Shams generously put its main building, Zaafaran Palace, at our disposal, to hold our meetings in its main hall. We succeeded in securing full cooperation between IESR, which organized the Course, and experts from all over Egypt, whethere from universities, academic centers, or the administration, so that the Course was enriched by some of the best expertise.

We were most happy to work with you and also to travel with you in our field visits to Alexandria and to Helwan, as well as in social events and cultural and recreational visits that could take place in the few free hours between sessions.

We were also most happy when we realized from the evaluation questionnaires that we asked you to fill, about the Course, that your evaluation was greatly positive and that you felt its results were useful. Your opinions as expressed in these questionnaires were fully free and your constructive suggestions will certainly help us to further improve our efforts.

Allow me to present to each one of you, in the name of the Institute of Environmental Studies and Research, a personal greeting, and to join with Prof. El-Hashimi, our University President who bade you farewell a few minutes ago in his office, his welcome to you at this University and to convey to you the best wishes greetings of H.E. Dr. Ahmad Fathi Sorour, Minister of Education, as well as his congratulations for the positive and constructive work which you have performed.

I ask you also to join me in presenting to Dr. A. Ghaznawi, UNESCO representative, our sincerest thanks and appreciation for the great effort he has put during the whole exercise, which was a real contribution to the Course. We also thank him for his fatherly and brotherly feelings towards all participants and organizers, which gave the course a special personal warmth.

I do not therefore say goodbye, but I say let us meet again to exchange ideas and experiences so that we can do something for the good of our developing countries and for the good of the world and the whole of humanity.

Thank you all and till we meet again.

A.3.2 Speech by Mrs. Soad Abdel Rassoul, Assistant Secritary General Egyptian National Commission for UNESCO

Mr. Chairman
Dr. Abdel Ghafour Ghaznawi
Dr. Mohsen Tawfik
Ladies and Gentlemen,

The Egyptian National Commission for UNESCO and I are honoured to express our warm and brotherly greetings to all participants.

Thank you for assisting such a successful course that tackles an important field that represents one of the main concerns of African and Arab countries.

The work done and the discussions that took place durig the course highlight the fact that man may be the source, the agent and the ultimate aim of development; still it is incumbent upon education to fit him for his role. If education is to stimulate, rather than obstruct development, it must be firmly rooted in the environment and it must develop the creative capacities of individuals and accord equal opportunities to all.

Allow me to extend particular thanks to Dr. Abdel-Ghafour Ghaznawi. I would also like to express my own gratitude for the limitless trust he has always had in the Egyptian scientific institutes, and for his pieces of advice and inducements that help us as a National Commission to play our role in the framework of UNESCO principles and ojbectives.

I would like to greet the Dean of the Institute of Environmental Studies and Research for his enthusiasm. Sincere devotion and constant work to make this course a real success. I am sure that the final report reflecting the proceedings of this course will serve as a reference for all those concerned with the incorporation of environmental education into technical and vocational education in Africa and the Arab world.

Finally, I address my warm and brotherly thanks to all the participants. They all have cause to congratulate themselves for the work done. I wish them a good return trip to their respective countries and hope to meet them again in Egypt.

A.3.3. Acknowledgement By: Terfassa Digga

Bismilahi Al Rahman Al Rahim
Prof. Mohsen Tawfik, Dean, Institute of Environmental Studies & Research,
Dr. abdul Ghafour Ghaznawi, UNESCO Representative,
Co-participants,
Ladies and Gentlemen,

It is my privilege and pleasure to have been chosen by the participants to deliver this acknowledegement on this occasion.

First, we thank Allah the All-mighty for this infinite mercy for guiding and protecting us throughout the duration of this very important training course, and for bringing it to a fruitful end.

We have come from different countries and since our arrival, we have been made feel at home and our stay have been made enjoyable and very educative. For this our gratitude and sincere thanks are expresses to the Government and People of Egypt.

We appreciate the valuable, co-operative and constant efforts of UNESCO and UNEP in trying to make our planet a place to live in and to create a valuable legacy for the generations to come. We are therefore grateful and thankful to UNESCO and its affliated bodies for their efforts and foresight.

This training course had been beneficial by various amininities provided by Ain-Shams University and the organizing committee. The organizing committee have made our stay in Egypt a memorable one and for these, we are greatly grateful and thankful to every body concerned. I should also like at this point to thank the Dean and Personnel of the Institute of Environmental Studies and Research, all the resource persons. Also our thanks go to the support personnel for their services and cooperation which have made our stay a pleasant one.

Lastly, we have come and have gained new experience and we should be going back with additional knowledge, awareness, attitudes and skills. It is my sincere hope that what we have gained will be beneficial not only to our countries but to all mankind.

With this short speech, I would like to end with Goodbye to Egypt and wish to my fellow participants a safe journey back to their respecitve countries.

A.3.4: Closing Address by Dr. Abdul Ghafoor Ghaznawi
UNESCO, Paris

Mr Chairman,
Professor Mohsen Tawfik, Dean Institute of Environmental Studies & Research,.
Mrs. Soad Abdul Rassul,
Ladies & Genglemen,
H.E. Professor Sorour, Minister of Education opened two weeks ago this Afro-Arab Training Course on the Incorporation of Environmental Education into Industrial Education. Time passes fast. The two weeks of lectures, group and individual work and educational & cultural field trips are over.

During the first week, the Course was enriched by a series of presentations by highly qualified & experienced resource persons from several educational institutions of Egypt on the ecosystem; biotic, mineral & energy resources; effects of heavy industry on the environment; hazardous wastes; air & water pollution; medical impacts; environmental education; and the incorporation of environmental education into industrial education. In the second week, the Course went into group work focusing on the preparation of two teaching units in industrial education with environmental education components which may be examined by interested educational institutions for local adaptation & use. I must also add that the Course went into individual work with the purpose of preparing a process and identifying needed actions, in the form of stategies, for incorporation of environmental education into industrial education in the country of each participant. The above mentioned units and strategies make important chapters of the final report whose draft was studied by the participants this morning. The different aspects of the Course were evaluated by a questionaire the results of which would be utilized in improving such Courses in future.

The draft final report will be amended by the Institute of Environmental Studies and Research on the basis of suggestions made this morning. The amended draft report shall be submitted Unesco on the basis of Article I-A-14 of Contract No. 109-009-8 for study and approval before reproduction.

The approved final report will be reproduced by Institute of Envirnmental Studies and Research in English and Arabic and Unesco shall be provided with 350 copies for dissemination to interested educational institutions.

The Course participants undertook educational field trips to Copper & Steel Factory and to the Royal Jewellery Museum in Alexandria and to the Helwan Steel Industry.

I should add that I had the pleasure of attending the ceromony of distribution of certificates of an Environmental Education Training Seminar for Imams of Mosques and teachers of religious schools which was organized in early 1988 in Benha by the Institute of Environmental Studies & Research with Unesco support. I am very pleased with the outcome of this Seminar.

Ladies and Gentlemen,

I want to thank H.E. Professor Sorour for opening the Course on 12 November 1988. I thank Professor El-Hashimi, President of Ain Shams University for his encouragement and support of the Course. Our thanks go to Egypt National Commission for Unesco for all the assistance provided for the Course. I must admit that Professor Mohsen Tawfik, Dean, Institute of Environmental Studies and his academic and support staff have worked for many weeks on the preparation and organization of this Course. Let us all thank them very sincerely for their efforts in making the Course a successful reality as well as for their generous hospitality. Similarly, our thanks go to the resource persons for enriching the Course and to the authorities in Alexandria and Helwan for accepting & supporting the field trips. I am grateful to all participants for their regular attendance of the Course and for their full efforts in fulfilling the requirements of the Course even through evening sessions.

Last but not the least, I want to thank the support personnel who served the Course during coffee-hours, the driver, the typists and guide persons and the rest. Each one of them did their best to make our work & stay most convenient.

Ladies and Gentlemen,

Unesco hopes that the knowledge & experiences gained during this Training Course will be of service to the participanting Member States in their renewal of industrial education through the incorporation of environmental education. This responsibility lies on the shoulders of the participants of the Course. I wish them every success in carrying out this responsibility which may lead to better understanding, protection and improvement of the indoor & outdoor environment by the industrial manpower. With this I announce the Afro-Arab Training Course closed.

## A.4 LIST OF PARTICIPANTS

1. Abdelrahman Ahmed Abdalla, Lecturer, Dept. of Education-College of Engineering Studies - Khartoum Polytechnic - Sudan.
2. Ismail Ahmed Magan, Head of Tech. Vocational Service, Ministry of Education P.O. Box 421, Magadisho Somalia
3. Abdulaleem Yaseen Abboud, Lecturer, Director in Scientific Section/ Curriculum Development, Ministry of Higher Education, Council of Technical Institutes, Al-Nidhal St., Baghdad, Iraq.
4. Ephraim A.A. Massawe, Research & Dev. Officer, P.O. Box 23235, Dar-es-Salaam Tanzania.
5. Eng. Magdi Maher Masiha, Theoretical Lecturer in the Indust. Tech. Institutes Ministry of Higher Education, The Industrial Technical Institute - Ministry of Higher Education, Post Box Madinet El Omal, Embaba- Cairo. Egypt.
6. Nazek Almohamadi Osman, Researcher, 13 Midan Al Mammalik, Alroda Cairo. Egypt.
7. Mustapha Ajibade Shekoni (INQR), Asst. Director Envir. Planning & Protection, Fed.Mins. of Works & Housing, Fed. Secretariat, Ihoyi, Lagos, Nigeria.
8. Ellen Asuko Wanaswa (Mrs), Curriculum Developer, P.O. Box 30231 Nairobi, Kenya.
9. Terfasse Digga (Mr), Coordinator, Social Science Panel, Curriculum Department, P.O. Box 2346 Addis Ababa, Ethiopia.

## A.5 LIST OF RESOURCE PERSONS

Dr. Abdeen, Abu-Bakr.
Consultant, Ministry of Higher Education

Dr. Besheer, Hussein.
Prof National Centre for Educational Research

Prof. Ebeid, William.
Vice-Dean, Faculty of Education, Ain Shams University.

Prof. El-Etr, Hassan.
Head of the Dept. of Environmental National & Sciences, IESR, Ain Shams University.

Dr. (Mrs) El Gohary, Fatma
Prof. Head of water pollution Laboratory
National Research Centre, Cairo.

Dr. Farag, Adly.
Consultant, Ministry of Education.

Prof. Fares, Refky
Head of the Dept. of Vocational Health, Faculty of Medicine, Ain Shams University

Dr. Gadallah, Mohsen
Faculty of Medicine, Ain Shams University.

Prof. Ghabbour, Samir
Institute of African Research and Studies Cairo University.

Dr. Kamal, Abdel Aziz
Faculty of Medicine, Ain Shams University.

Prof. Massoud, Aly.
Head of the Dept of Societal Medicine.

Prof. Mobarak, Amin
Faculty of Engineering, Cairo University .

Dr Nasralla, Mahmoud.
Prof. Head of Air Pollution Laboratory National Research Centre, Cairo.

Prof. Selim, Saber.
Facultry of Education, Ain Shams University, Cairo.

Eng. Tantawy, Mohammed.
President of the Iron & Steel Complex in Helwan

Prof. Tawfik, Mohsen.
Dean, Institute of Environmental Studies and Research, Ain Shams University, Cairo.

## A.6. LIST OF COUNTRY REPORTS

1- EGYPT
2- ETHIOPIA
3- IRAQ
4- KENYA
5- NIGERIA
6- SOMALIA
7- SUDAN
8- TANZANIA

## A.7.1: ENVIRONMENTAL EDUCATION AND ITS INCORPORATION INTO INDUSTRIAL EDUCATION (*)

By Dr. Abdul Ghafoor Ghaznawi, Programme Specialist in Environmental Education, Unesco, Paris

### I- Introduction:

The objective of this paper is to elaborate the development of environmental education and suggest some guidelines for its incorporation into industrial education. In this context the paper introduces the concept of the environment and the place of humanity in it; background, goals, objectives and guiding principles of enviornmental education; some environmental education actions at international, regional and national levels; and makes suggestions for the incorporation of environmental education into the curriculum, teacher training and evaluation for industrial education. The materials presented at this paper are not exhaustive on the topic under consideration. These are selected topics to serve as discussion guide in spurring thinking and discussion on the incorporation of environmental education into pre-university industrial education.

### Ii- The Place of Humanity in the Environment

1. Environment may be conceived as the home, the village, city, country or the world. The Environment(Protection) Act-1986 of India states that "Environment includes water, air and land and the interrelationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organisms and property"(1). Environment has also been considered as the sum total of all the factors that affect an organism. Environment was also defined as "the biosphere and its implications for mankind" (2). The most comprehensive definition of the environment came out in the work of the Intergovernmental Conference on Environmental Education, Tbilisi, USSR, October 1977. In this context, the environment is considered to consist of a "whole set of natural and social systems in which man and the other organisms live and from which they draw their sustenance. This concept embraces the natural and man-made resources and products whereby human needs are satisfied. The natural environment consisting of the four interlocking systems of the atmosphere, the hydrosphere, the lithosphere, and the biosphere are in constant change but the nature and system of such changes are affected by human activities. The social environment includes human groups, the material infrastructures built by man, and the production relationships and institutional

(*) Opinions expressed in this paper are those of the author and to not necessarily coincide with those of Unesco.

systems that he has devised. The social environment shows the way in which human societies have organized themselves and how they function in order to satisfy, first of all, needs relating to food, shelter, health, education and work. When in certain societies, these basic needs have been met, man pursues more ambitious aims: drawing on his experience, the lessons that science has taught him and the tools that technology offers him, and spurred on by his thirst for progress and novelty, he has sought greater fulfillment in the twofold pursuit of intellectual and spiritual enrichment and material comfort" (3). In brief, environment has a holistic nature consisting of its different physical, biological, social , cultural, economic, political, etc. dimensions which are interrelated with and interdependent on each other. The holistic nature of the environment which is dynamic has gradually developed and continually undergoes changes and further develops towards a more stable holistic state.

2. Humanity is an integral part of the environment and there is a two-way reaction between them. That is to say humanity and environment shape each other to reach a dynamic and stable humanity-environment relationship. The present state of this relationship is the result of thousands of years of interaction between humanity and the environment and it could easily be disturbed by forceful natural catastrophies and/or by humanity's continued unsound interventions in the environment. It is to the advantage of humanity if this dynamic and stable humanity-environment relationship is maintained otherwise rapid dis-equilibria will put stress on one or both sides which may lead to different consequences, mainly environmental problems, resulting to humanity's disadvantages.

3. It was the lack of comprehensive knowledge about the total environment, its components, their interrelationships and interdependences on the part of humanity on the one hand and his ingenuity in the creation and use of new machineries and equipment and harnessing of enormous power and energy resources on the other, which led humanity to intervene in the environment as a limitless resources. This has resulted in environmental pollution, resource depletion, ecological imbalances and destructions which have turned themselves towards humanity's present and future generations. Some of these problems were sharply felt in the industrialized countries in the 1950s and 1960s which led to environmental awareness, concern and actions at different levels.

4. The study of the holistic nature of the environment, of the ongoing forces in the environment and their interactions with each other, of the global environmental problems and their long-term impact, on environmental conditions, and of the humanity-environment relationship and the consequences of stress on either elements of this relationship are the frontiers of knowledge that challenge environmental scientists, sociologists, economists, technilogists, researchers, politicians,

etc. The obtaining of the above knowledge is essential for sound interventions in the environment for sound sustainable development. In this context one can foresee high research priorities and achievements in this field in the future. Consequently, numerous universities around the world have engaged themselves in the creation of departments or faculties of environmental sciences. The environmental knowledge harnessed by environmental science institutions needs to be translated into educational messages and disseminated to all layers of the society through formal and nonformal environmental education. This is one of the main reasons for organizing this Training Course in one of these environmental science institutions, namely the Institute of Environmental Studies and Research of Ain Shams University.

## III. ENVIRONMENTAL EDUCATION

### A. BACKGROUND

5. It was during the United Nations Conference on Human Environment, Stockholm, Sweden, 1972, that for the first time governments at the highest level came together to take stock of what mankind had done to the environment of which he was an integral part. Industrialized countries expressed their shock of what had happened to them in the process of industrialization and fast development while developing countries expressed that poverty and under-development were the major factors of their environmental degradation (4). Thus, a global concern was expressed and needed actions were formulated.

6. Recommendation 96 of the Stockholm Conference stated that "the Secretary-General, the Organizations of the United Nations System, especially the United Nations Educational, Scientific and Cultural Organization, and the other international agencies concerned, should after consultation and agreement, take the necessary steps to establish an international programme in environmental education, interdisciplinary in approach, in-school and out-of-school, encompassing all levels of education and directed towards the general public, in particular the ordinary citizen living in rural and urban areas, youth and adults alike with a view to educating him as to the simple steps he might take within his means, to manage and control his environment" (5). Thus, environmental education was recognized and its development was recommended by the world community as a measure for the understanding, protection and improvement of the environment and its quality. It is on the basis of the above that environmental education has emerged as a continuous process to provide its target groups through constant renewal of its approach, contents and methods, with knowledge that is geared to changing conditions of the environment.

7. In response to the above recommendation, Unesco in cooperation with UNEP launched the Unesco-UNEP International Environmental Education Programme (IEEP) in 1975 which is housed in Unesco Headquarters in Paris. IEEP's objectives are to assist governments, national, regional and international, regional and international institutions to incorporate environmental education (EE) into formal and nonformal education systems and programmes in order to (i) make people aware of the nature of the relationship between humanity and the environment on which he depends; (ii) impart knowledge and skills to understand and solve environment and development related problems; and (iii) enable people to acquire the attitudes and motivations leading to sound decisions and civic actions for the protection and improvement of the environment and its quality.

8. In order to reach at needed agreement at international level on the concept, goals, objectives and guiding principles of environmental education and to develop strategies for its development which could serve as a common denominator in educational renewal at national, regional and international levels, Unesco in cooperation with UNEP organized, in the context of IEEP activities, the first Ministerial Intergovernmental Conference on Environmental Education in 1977 in Tbilisi (USSR).

B. GOALS

9. The goals of EE formulated and adopted at the Tbilisi Conference (6) are: (i) to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas; (ii) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; and (iii) to create new patterns of behaviour of individuals, groups, and society as a whole towards the environment.

C. OBJECTIVES

10- The objectives of EE endorsed at the Tbilisi Conferene (7) are:

(i) Awareness: to help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems.

(ii) Knowledge: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.

(iii) Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection.

(iv) Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

D. GUIDING PRINCIPLES

11. The guiding principles of EE developed and endorsed at Tbilisi Conference (8) are:

(i) To consider the environment in its totality - natural and built, technological and social (economic, political, technological, cultural-historical, moral, aesthetic);

(ii) To be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal states;

(iii) To be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;

(iv) To examine major environmental issues from local, national, regional and international point of view so that students receive insights into environmental conditions in other goegraphical areas;

(v) To focus on current and potential environmental situations while taking into account the historical perspective;

(vi) To promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems;

(vii) To explicitly consider environmental aspects in plans for development and growth;

(viii) To enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;

(ix) To relate environmental sensitivity, knowledge, problem-solving skills and values clarificaton to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years;

(x) To help learners discover the symptoms and real causes of environmental problems;

(xi) To emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;

(xii) To utilize diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience.

E. SOME EE ACTIONS

12. Ten years after the Tbilisi Conference Unesco and UNEP organized the International Congress on Environmental Education and Training in August 1987 in Moscow (USSR) which was attended by over 300 specialists from 100 countries plus observers from IUCN and other international organizations (9). The Congress took stock of environmental education development since 1977 and established EE strategies for the development and promotion of environmental education in the 1990s. Two concrete recommendations addressed to Unesco and UNEP are to announce the 1990s as the Decade of Environmental Education and to organize the next International Congress on Environmental Education in 1995 to identify priorities and spearhead the development of environmental education towards the first decade of the 21st century.

13. Similarly, global environmental concern has led in the last decade to the undertaking of major studies such as the Global 2000 Report.to the President; World Commission on the Environment and Development; and World Conservation Strategy. Environmental education is emphasized by each of the major studies to be developed for environmental awareness, attitudes, civic actions and ethical responsiblities on the part of present and future generations.

14. Thus, environmental education is the educational process through which is imparted to its target groups in schools, homes, factories, farms, etc. the environmental sensitivity, awareness, knowledge, understanding, attitudes, skills, commitments and civic actions needed for understanding protection and improvement of the environment and the prevention of solution of its allied problems. In other words, the mission of environmental education is to foster environmental literacy among all citizens who should make sound judgement and decisions and have ethical responsibilities about the environment and its related issues.

15. In the above context, environmental education serves as a common denominator in educational renewal at all levels of education by enhancing inter-disciplinarity among the different subjects and by relating education to the real life of its target groups. Environmental education advocates problem-solving approach as a skill which could help and guide its target groups in the solution of current and future environment and related problems.

16. The development of environmental educaton is taking momentum as more and more countries are realizing its needs and take necessary actions for its incorporation into their respective educational systems through different methods. Four activities which follow can explain briefly the interest

of Member States and the methods used in the development of environmental education.

17. Malaysia has pioneered in environmental education curriculum reform by replacing the five classical subjects of mathematics, science, health, history and geography with a single subject called Man and His Environment at grades 4, 5 and 6 in all of its primary schools. The fundamental educational strategy in this major curriculum change is to apply an inter-disciplenary approach to teaching/learning in the early years of formal education.

18. India, after a decade of study and experimentation, finally formulated the National Policy on Education (NPE) 1986. Article 8.15 of this policy concerns Education and Environment which proclaims that "There is a paramount need to create a consciousness of the environment. It must permeate all ages and all sections of society beginning with the child. Environmental consciousness should inform teaching in school and colleges. This aspect will be integrated in the entire educational process" (10). Thus, by this mandate, EE has become an integral part of the educational development from pre-primary to higher education in India where educational institutions are actively involved in translating the above national policy decision into curriculum, textbooks and teacher training programmes and materials for all types and levels of education.

19. Another experience in EE development in Asia is that of the six ASEAN Countries (Malaysia, Singapore, Indonesia, Philippines, Thailand and Brunei) which are undertaking a joint project on training of secondary school science teachers in EE with UNDP support and executed by Unesco. In this project, four teacher educators, school supervisors and experienced teachers from each country are trained in a three-week subregional training course and then the course is adapted and repeated at the national level to train some 50 teacher educators in each country with the hope that it will be further continued at the district levels.

20. The fourth unique experience that I should like to refer to is in the domain of nonformal environmental education which has taken place in Sri Lanka under Operational Project on Environmental Protection and Management. The ultimate target group of this project has been the general public whose environmental literacy for making better decisions concerning the different aspects of the environment has been the fundamental objective. This project has led to the development of a functional infrastructure at the Central Environmental Authority of Sri Lanka (CEA), to the training of a group of qualified key personnel, to the development of student and teachers manual in EE for middle schools, to the development of a baseline study on the environment for the purpose of identifying the pressing environmental problems of Sri Lanka,

to the organization of a national seminar for awareness of environmental officers and needed measures for their soltution and prevention, and to the preparation of a film and a series of slides on water pollution as well as the organization of a national painting competition on environmental problems of Sri Lanka. This unique experience in the development of public awareness, commitments and actions for the protection and management of the environment is a clear indication of the importance that the Government of Sri Lanka has attached to the protectinn and improvement of the physical, biological and socio-cultural dimensions of the environment in Sri Lanka. This project was further followed up by the organization of an inter-institutional seminar on EE in which several universitites and ministries participated. The outcome is a set of recommendations that spearhead the development of EE in Sri Lanka towards the 21st century. Thus, environmental education is developing as a dynamic measure for the understanding, protection and improvement of the environment and its quality in Sri Lanka.

## IV- INCORPORATION OF EE INTO INDUSTRIAL EDUCATION

### A. AUTHORIZATION:

21. Industrial education covers a wide spectrum of inservice and preservice educational activities at secondary school and university levels aimed at preparation of manpower needed for industry. In certain cases industrial education is provided through short-term courses to reorient inservice personnel of industry towards new operations. In some countries, industrial education is offered through theoritical and practical courses within the pregular programme of general education at middle and secondary schools. Other cases are separate industrial schools for one to three years aimed at middle school graduates. In rather industrialized countries, industrial education is achieved through one to four years of post secondary education. Thus, it is difficult to talk about a fixed programme or curriculum that could have pertinence to all situations. However, the broad objectives of environmental education and its guiding principles may have general applicability in all situations. It is the environmental education dimension of the curriculum that ought to be tailored to the needs of trainees in particular situations.

22. For the incorporation of EE into industrial education it is essential to establish the needed mandate or authorization and responsibility for industrial educational institutions to abide with. Without authorization and responsibility, EE will stay as a peripheral subject or activity and it may never be established as a needed part of the core of industrial education curriculum for students and teachers. The formulation of the mandate and guidelines for environmentalization of industrial education may be achieved by a

high level educational committee. This committee has to be assigned by the decision makers at the highest level. The involvement of industrial sector, especially if there is a private sector, in the formulation of the mandate based on actual needs is essential and this would enlarge the basis of contribution and commitment and responsibilities particulary at the stage of implementation.

B. CURRICULUM RENEWAL:

23. The next stage to focus upon is the renewal of the curriculum because "the content of the curriculum in technical and vocational education is currently oriented towards developing competencies related to economic activities and covers operations and processes like design, construction/ fabrication, testing, operation, maintenance, servicing, repair etc. Currently, there is more emphasis on optimising productivity through efficient maintenance than there is on environmental aspects in the the curriculum" (11). Thus, the need for renewal of industrial education curriculum with respect to the environment. In this paper the curriculum contents considered are those for the industrial schools at senior secondary level (grades 10, 11 and 12).

24. For renewal of curriculum, it is again essential to designate a committee consisting of curriculum experts, experienced teachers, experts from industry, environmental science experts and community representatives (13). Their task will be (i) to formulate EE objectives for industrial education, (ii) to examine the curriculum of the primary and middle schools attended by the industrial school students and to identify the environmental education concepts already covered so that it could serve as one of the basis upon which the environmentalization of industrial school curriculum could be based, (iii) to examine the industrial school curriculum and identify its environmental education components to be used as another fundamental base upon which to start environmentalization, (iv) to identify local environmental problems, additional EE contents required, appropriate activities, time needed for different subjects and topics, instructional methodologies, appropriate instructional materials and evaluation techniques, all with close relation, to and bearing upon industry and its education. The amalgamation of the above elements and their organization for grades 10, 11, and 12 would form the environmental education dimension of the curriculum for industrial schools. The nature of identified EE objectives and pertinent environmental contents and problems will give the curriculum its essential local dimension.

25. The above EE dimension of curriculum for industrial schools may be delivered through different mechanisms depending on the priorities of industrial education institutions for environmentalization of their school curriculum and teacher education and the needed personnel and facilities at their disposal. Following paragraphs indicate some of these mechanisms.

26. The first mechanism is to improve the teaching of the identified environmental topics in the ongoing curriculum. This requires the development of new EE teaching objectives, teaching methods, and their inclusion in the daily lesson plans. Modules may also be prepared on certain concepts such as air, water, land, plants, energy, etc. and infused into the teaching/learning process in the context of the implementation of existing curriculum.

27. The following is a module developed on the concept of energy (13) which can serve as an example. It contains an introduction, general objectives and topics with specific objectives, issues and suggested corrective measures.

Introduction: The energy man uses comes directly from the environment and includes renewable and non-renewable sources If non-renewable sources are not effectively managed they will be depleted. At the same time, use of these energy resources can result in significant pollution of the environment. This module is intended to provide the student with an understanding of the effects of the uses of these resources by industry as well as management of corrective measures that can be taken to conserve and minimise their pollution effects. Health and safety aspects are also emphasised.

General Objectives: The student should: (a) show an understanding of the effects of pollutants from energy sources; (b) understand that the effects of these pollutants can be reduced by initial controlling strategies; and (c) understand that health and safety are of prime importance in planning for the use of these energy sources.

| CONTENT | SPECIFIC OBJECTIVES: STUDENTS ARE REQUIRED TO UNDERSTAND: | ISSUES/EFFECTS | CORRECTIVE MEASURES |
|---|---|---|---|
| Non-renewable energy sources | -That some energy resources cannot be renewed; | Conservation; | Installation and controling devices; |
| | -The use made of these sources. | Waste disposals Consideration of resources; | Monitoring of discharge of waste from marine vessels; |
| | -The proper management of these resources e.g. coal and oil. | Expensive infrastructure; Reduced efficiency | International legislation (Laws of the Sea) |
| Renewable energy | -That some energy resources are renewable, e.g. hydro, solar, wind, wave. | Limited usage. | |
| Health and Safety | -The proper usage of energy-related equipment; | Health | |
| | -The possible health hazards connected with their use; | Pollution and oil spills | |
| | -Arc eye, | | Welding behind screms use of shields |
| | - Earthing, | | |
| | - Exposure to ultra-violet rays, | | |
| | - radiation. | | |
| Power plants | -the main pollutants from power plants and their effects on the environment. | Land pollution Water Pollution Air Pollution | Installation and controlling devices |

28. Introduction of a compulsory EE subject or topics for all students of technical and vocational education is consi dered a high priority. This may be achieved by introducing a new compulsory course on EE. If the curriculum is too crowded it can be studied for substitution of an obsolete course by the EE course or by the merging of two or three old courses to make room for an EE course or courses. If the substitution or merging of courses cannot be achieved, the other alternative is to infuse the compulsory environmental topics through units or modules into all teaching subjects of technical and vocational education which includes industrial education.

29. The following are a few compulsory topics which may be offered through a compulsory course or may be infused into relevant existing courses in the curriculum(14):

- Humanity and the environment.
- Safe work habits, safe work environment.
- General types of environmental pollutions, air, water, land, noise, vibrations, radioactivity.
- Lighting, ventilation and space.
- Ecological principles.
- Renewable and nonrenewable resources.
- Management of natural resources.
- Conventional and non-conventional energy.
- Occupational hazards.
- First-aid.
- Properties of materials (bio-degradable and non-degradable).
- Fundamental principles of recycling processes
- Typical environmental problems: deforestation; desertification; landslides; silting and drying of water resources; pollution of lakes and water ways; toxic substances and their disposal.
- Natural disasters and accident,
- Human physiology.
- Environmentaly sound sustainable development.

These topics are over and above those topics covered in the school curriculum. Where-ever a topic is repeated, its scope and coverage should be amended.

30. For industrial education, (Engineering and Technology) the following or similar environment related topics may be infused into appropriate existing courses (15):

- Fire prevention and protection.
- Materials handling and storage.
- Plant layout, organization and management.
- Chemical hazards.
- Environmental pollution laws and regulations.
- Radiation safety.
- Conservation of energy (fuel).
- Industrial laws.

31. For the different branches of industrial education, a series of elective or optional topics to be offered in the course form are the following (16):

Civil engineering: Industrial preventive maintenance; oil and spillage control; and management of industrial wastes and effluents.

Electrical enginnering: Electrical installations in multi-storeyed buildings; unconventional sources of energy; and escalators and elevators.

C. TEACHER TRAINING RENEWAL:

32- There is urgent need to renovate teacher training for industrial schools with the incorporation of environmental education. It is the teacher who makes a curriculum function. This can be done if the teacher is trained through preservice and inservice programmes. If industrial education teachers are trained in environmental education they can also help in the formulation and development of suitable curriculum and teaching materials referred to earlier. The environment of teachers in curriculum and materials renewal will lead to teachers commitment and responsibility for the effective implementation of the curriculum and teaching materials. Industrial school teachers should be trained through inservice and preservice environmental education programmes.

33. It may be reasonable to give priority to the inservice training of industrial school teachers in order to have an immediate environmental impact on students who are undergoing industrial education especially those in the last year of their schooling. Inservice teacher training may be achieved through well prepared one or two-week workshops or summer institutes.

34. It is very essential that when industrial curriculum renewal with respect to environmental education is undertaken, it should include teacher education renewal as well despite the usual separate administrative setups responsible for curriculum development and teacher education for industrial schools.

35. Preservice teacher education should be based on the courses and elements of the environmental education dimension of the curriculum for industrial schools. This core may be further developed to suit the level of the teacher with due consideration to their needs in the cognitive, affective and psychomotor domains.

D. TEACHING METHODS:

36. Teaching methods that may be used in environmental education are lecture, demonstration, discussion, field trips, projects games, simulation, debates. case studies, competitions, industrial fairs, exercises and laboratory work. One or more methods may be opted for that may match and facilitate the teaching/learning of a curriculum element.

37. However, EE advocates the use of the environment as a living laboratory in the teaching/learning processes at all levels of education. This approach has its unique place in industrial education of learning by doing is opted for as a teaching method and strategy.

38. Learning by doing can be achieved in the environment by undertaking experiments at micrc and/or macro levels with air, water, soil, plants, animals and their interactions with and interdependence on each other. Environment is always the field for the unknown to be discovered by the learners in accordance with their age level. If activities are well planned in this respect, learners will not only understan the environment better but they will be initiated in research thinking,techniques and activities and will also become aquainted with problem-solving approach.

39. Furthermore learning can be facilitated and made more appealing and possibly become more permanent if it is achieved through research and experimentation in the indoor and outdoor environment requiring problem identification, observation exploration, data collection and interpretation, formulating solutions and reaching conclusions, for example, on the holistic nature of the environment, the interdepencies of the different elements in an ecosystem, the simultaneous physical, chemical and biological changes that are in action in an exosystem or in the environment in general. This origentation ought to be accomodated in the curriculum development ( (Objectives, contents, methods, activities and evaluation) and teachers should be well trained through preservice and inservice programmes on the understanting and use of the environment, as mentioned above in the teaching/learning processes.

E. EVALUATION :

40. Evaluation in this context is the process of finding out if EE objectives in the context of teaching/learning in industrial education have been fulfilled. Results of an evaluation are feedbacks indicating the achievement and weakness of the students and the productivity of the efforts of the teachers.

41. Feedbacks are essential to guide the students to improve their learning efforts, to help the teacher to adapt hiss teaching for better learning and to improve the school curriculum if certain difficulties are encountered. Evaluation instruments in industrial education may be revised and renewed to accomodate environmental questions based on the

objectives and contents of environmental education that have been incorporated into industrial education. Particular emphasis is put on the inclusion of environmental dimension in the examinations that entitle the students for passing to higher grades and/or receive achievement certificates. This is an important factor in obliging the teachers and students to give enough time and attention to the teaching and learning of environmental dimension in industrial education. If the environmental dimension is not tested or evaluated the development of environmental education will always remain as a peripheral activity with the possibility of being dropped someday.

42. Evaluation of knowledge and skills may be done satisfactorily through essay, objective tests, true and false questions, short answer questions, project assessment, laboratory work and report, survey, case studies etc.

43. The fundamental task in the teaching of environmental education is to inculcate sound environmental attitudes and ethical responsibilities conductive to sound civic actions. This task is achieved through a long period of time and there are not standardized evaluation instruments that could measure this type of affective learning. The immediate need is to develop effective instruments for evaluating this type of achievement. This is a high priority in industrial education.

## REFERENCES


1. Ministry of law and Justice, The Environment (Protection) Act, 1986, No. 29 of 1986, Chapter I, Article 2 (a), New Delhi, India, 26 May 1986.
2. Universities and Environmental Education, Unesco and International Associations of Universities, Paris, 1986, (page-13).
3. Unesco, Education in the Face of Environmental Challenges, Paris, 1977 (ENVED-4).
4. Strong, Maurice F., Conservation Strategies for a changing World, Pieces of the Global Puzzle, Fulcrum Golden, Colorado, 1986, (page-6).
5. U.N., United Nations Conference on Human Environment, Stockholm, Sweden 1972, Final Report.
6. Unesco-UNEP, Intergovernmental Conference on Environmental Education, Tbilisi, USSR, 1977, Final Report,. (page-26).
7. Ibid.
8. Ibid (page-27).

9. Unesco-UNEP, International Strategy for Action in Field of Environmental Education and Training for the 1990s, 1988, (page-1).

10. Department of Education, Ministry of Human Resource Development, Government of India, National Policy on Education, 1986.

11. Colombo Plan Staff College for Technician Education, Consultation Meeting on the Incorporation of Environmental Education Into Technical & Vocational Education Singapore, 10-14 March 1986, Final Report.

12. National Council of Educational Research & Training Subregional Training Seminar on the Incorporation of Environmental Education into Industrial Education for Asia, New Delhi, India, 20-27 April 1987, Final Report.

13. College of Arts, Science & Technology, Subregional Training Seminar on the Incorporation of Environmental Education into Industrial Education for the Caribbean, Jamaica, 9-16 May 1988, Final Report.

14. National Council of Educational Research & Training, Subregional Training Seminar on the Incorporation of Environmental Education into Industrial Education for Asia, New Delhi, India, 20-27 April 1987, Final Report.

15. Ibid.

16. Colombo Plan Staff College for Technician Education, Consultation Meeting on the Incorporation of Environmental Education Into Technical & Vocational Education, Singaporte, 10-14 March 1986, Final Report.

## A. 7.2 RESUME OF ENVIRONMENTAL EDUCATION IN TECHNICAL AND VOCATIONAL EDUCATION

An essential document for technical and vocational education planners. After document identification the present status of environment is introduced, followed by some of the Unesco activities in this regard. General objectives of EE * are summarized and the importance of EE in technical and vocational education is pointed out. A distinction between Inner and Outer environment is made followed by showing the complexity of EE in these environments. Finally the EE for Technical and vocational education is emphasized as Planning, Levels, and teacher training.

I- This Document:

This document has been written by "Seen Grabe," Former Senior research officer at the International Labour Office.

It has been prepared in the context of activities of Unesco-UNEP International Environmental Education Programme (IEEP) with the objectives to spur reflections on the need, importance and place of environmental education (EE) in technical and vocational education and to provide general suggestions for the incorporation of EE into TVE. The draft of this document was presented and discussed at the Consultation Meeting on the incorporation of Environmental Eucation into Technical and Vocational Education, 10-14 March 1986, Singapore.

The paper is divided into six main parts. After a brief introducation setting out the main reasons why environmental subjects should be given increased attention in technical and vocational education a second chapter deals in some detail with the main environmental issues which are or may be considered relevant in this context. The third chapter seeks to pin-point the elements of environmental risks which relate to the various levels and sectors of technical and vocational education. Chapter four is primarily concerned with the integration of environmental education into the curricula-when such elements are best made part of the teaching of other subjects or skills, and when they may form a separate subject. Chapter five is mainly devoted to the effects on teacher/instructor training requirements when more attention is given to environmental issues in technical and vocational

---

* EE: Environmental Education.

education. Chapter six, finally, provides a brief summary of the paper, in which the principal aspects and problems are highlighted.

## II- The Present Status of Environment:

Technical personnel are exposed to the same general environmental risks and may affect the environment in the same ways as any other people.

Mass media are providing examples every day of the accumulation in recent years of damage to the environment resulting from a wide range of technological applications. Forests are dying and fields losing their fertility due to acid rain, due,originally, to increased use of sulphur-carrying combustibles in the production of energy or heat. Lakes and water streams polluted by detergents, animal and human wastes and fertilizers, pesticides and herbicides leaking from agricultural fields and forest lands, choking fish and other aquatic life through overfertilization, or killing them by direct poisoning. Even more impressive are the occasional- increasingly frequent - reports on gas leaks from chemical plants, explosions and fires caused by sloppy handling of risky operations or negligence in control and maintenance of safety equipment or the smog clouds moving in over large cities, causing death and disease.

There are also almost daily accounts of negative effects on the human environment in industry and in many other fields of economic activity of new materials and equipment, introduced without proper regard to the side-effects which they may have on those who will use them in their work or on the ultimate consumer; asbestos dust causing severe lung damage; faulty isolation of houses providing breeding grounds for moulds emitting poisonous gas; badly organized work places, without proper arrangements for the evacuation of polluted air, dust particles and other impurities or poisonous elements,,causing unhealth among workers; insufficient filtration of emissions - by water or air - from housing complexes and factories causing harm to whole areas. These are but a few examples of an accelerating environmental destruction in modern society- destruction of the human environment, destruction of flora and fauna, and destruction of human health.

## III- Some of the Unesco Activities in EE:

The Stockholm Conference on the Human Environment, in 1971, attached special importance to the role of education in combating the threats to the human environment. All forms of educational activities should be mobilized to contribute to making young persons and adults aware of both the urgency of the environmental problems of our time and of what can be

done, collectively and individually,to turn the trend around. Unesco was given main responsibility for environmental education and for advising governments and the various public and private bodies concerned on how educational programmes and institutions could share in the common effort of a world environmental programme.

Along this general line of policy Unesco has prepared and published a number of studies, undertaken in close co-operation with the United Nations Environment Programme and other international agencies concerned, on how environmental issues might best be covered in the programmes of institutions for general education at the various levels. The prupose of this paper is to carry these efforts one step further by suggesting ways and means for integrating environmental issues also into the programmes and curricula of technical and vocational education.

General issues of environmental education were the subject of the first Intergovernmental Conference on Environmental Education, which was held in Tbilist (Georgian SSR, USSR, 14-26 October 1977), organized by Unesco in co-operation with the United Nations Environment Programme. The Conference Coclusions were supplemented by a survey of international environmental education needs and priorities in which 80 per cent of Unesco's Member States took part. Furthermore an international workshop was held in Belgrade (1975) and regional and subregional meetings on environmental education organized in Africa,the Arab States, Asia, Europe and Latin America,

The Tbilisi Conference adopted 41 recommendations covering a wide range of questions relating to national as well as international aspects of environmental education. Of special relevance to the present study are the recommendations relating to the aims and objectives of environmental education, guiding principles to be applied in the design of programmes and the selection of target populations, and to educational methodology.

The principal subject of the recommendations of the Tbilisi Conference is the broad environmental issues. There is little mention of the specific problems that should be dealt with at the various levels of general education or in technical and vocational education. These have been the subject of further studies carried out by Unesco in close co-operation with the United Nations Environment Programme and by various Specialized Agencies such as the International Labour Office, FAO, WHO and others, including a wide range of non-governmental organizations and regional bodies. The range of such activities is too wide for special mention to be made here. Only a few examples directly relevant to the present paper may be given.

Unesco has, in the course of the eight years which have passed since the Tbilisi Conferenee adopted its recommendations, published practical guidelines and discussion guides relating to strategies for developing an environmental education curriculum and the training of teachers in environmental education ( both in 1980). It has further published modules for pre-service training of teachers and supervisors for primary schools and science teachers and supervisors for secondary schools as well as a module for in-service training of science teachers and supervisors. for secondary schools.

IV- General Objectives of EE:

EE should cater to all ages and socio-professional groups in all countries. Five categories of EE objectives could be identified: 1) awareness, 2) Knowledge, 3) attitudes, 4) skills, and 5) participation.

Emphasizing the importanee of developing understanding (of) the complex relations between socio-economic development and the improvement of the environment'. A basic aim of environmental education is to succeed in making individuals and communities understand the complex nature of the natural and the built environments resulting from the ineraction of their biological, physical, social, economic and cultural aspects, and acquire the knowledge, values, attitudes and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and in the management of the quality of environment'. As regards educational content, environmental education should 'Provide the necessary knowledge for interpretation of the complex phenomena which shape the environment and encourage those ethical, economic and aesthetic values which,constituting the basis of self-discipline, will further the development of conduct compatible with the preservation and improvement of the environment; it should also provide a wide range of practical skills required in the devising and application of effective solutions to environmental problems'.

V. Important Objectives of EE in TVE*:

Technical personnel are exposed to the same general environmental risks and may affect the environment in the same way as any other people. In other words, they need the same general environmental education- adapted to the particular circumstances and environmental characteristics of the locality, the region and the country in which they are living.

* TVE.... Technical/Vocational Education.

Technical personnel -- receiving their training in courses of technical and vocational education for young persons as well as for adults - do, however, require more than the general introduction into environmental issues than those who attend general education only. They need to learn to appreciate - identify and evaluate - the effects of their professional work on the environment; the risks to nature at large involved in the types of operations that they will be or are performing in their occupations. They need, in particular, to be aware of the environmental properties of the raw materials they are using, the processes which they are designing or controlling and the risks that those around - at the work place or around it - may be exposed to. Those around, in this context includes not only the human beings but the flora and fauna, the soil, the air and the water in the immediate neighbourhood as well as further away.

The wide range of functions carried out by technical staff serves to emphasize the need for lifelong environmental education. So does the fact that technical staff over the years often change their fields of work and the level of their responsibilities. The skilled worker, trained as a mechanic or as an electrician may, 10 or 15 years after graduation from a vocational school, serve as foreman in a maintenance team or a production unit. A technician may go through a number of specialized jobs with little - or as the case may be major, for instance as a safety engineer --responsibility for environmental issues, ending up as a unit manager, responsible for both the production and the safety and health of the workers. Graduate engineers often rise to senior management positions.

For technical personnel the content should cover all the three basic aspects of environmental protection and improvement; the what, the why and the how. It should cover, with reference to the particular field in which the indiviual student is likely to be engaged or is already working:

1. The elements within his particular field of economic activity that may have an impact on the outer environment, put people, flora and fauna at risk if the process gets out of control or more commonly, if wastes are dispersed indiscriminately ;
2. Know what can and should be done to eliminate the risk factors or to keep them under control within permissible limits - and how this is done;
3. Know how to estimate the risks and to calculate costs and benefits - including long- term environmental cost - eliminating them.

VI. Inner and Outer Environmental Education:

Environmental education relating to the inner environment - the work place - differs in many respects from that relating to more global environmental aspects. Common features are knowledge of poisonous elements used in the work processes, accident risks relating for instance to the storage of gases and inflammable materials, which, if the maintenance work is not properly done, or unsafe methods used, may be equally threatening to those at the work place as to the world around. But the main concern of environmental education relating to the inner environment at the work place is the safety and health of those employed. Main aspects are, for instance, such environmental factors as ventilation and more generally clean air, the climatic conditions ( heat and cold), noise and vibration, the organization of the work place- including for instance traffic rules- the risks involved in the handling of the various types of equipment and materials - including health risks - the proper use and storage of dangerous substances, and potential exposure to radiation.

The risks found in the inner environment can be ranged under four main headings:-

1. Organizational risks. These relate in the first instance to the organization of the work process and the order kept at the place of work.

2. Equipment-related risks. These are primarily concerned with the safety and health of the individual.

3. Process-related risks. These include the safe handling of raw materials, and intermediate and final products.

4. Product-related risks. These include the precautions that should be taken by the users of the product and relate in the first instance to communications from the producer to the client.

The issues relating to the outer environment of special importance to technical staff concern the impact on the quality of life on earth of the type of activity in which they are engaged. Central aspects are the impact of emissions from productive units carried through air or water with humans, animals and plants at the receiving end. Included under this general characterization are also the transformation taking place for instance in polluted air - the 'acid rain problem', for instance - and the chains of accumulation in nature - for instance the absorption of heavy metals such as mercury by micro-organisms, finally ending up in the larger species of fish, or the effects of DDT and other similar

substances, such as road salt on bird life and the fertility of birds - the 'silent spring syndrome'.

Central environmental issues are also the properties of products - of increasing importance with the proliferation of chemical substances used in a widening range of economic activities incluing agriculture and manufacturing industry - the safety and health risks that may be connected with their use and the impact they may have on the environment when used. Examples of problems in this respect are the health risks accompanying the handling of asbestos, the gas emissions that may result from improper insulation and ventilation favouring the growth of moulds, but also the construction of toys that may endanger the health or even the life of children playing with them. A third central theme should be the effects of exploitation of natural resources - whether limited or - including, for instance such aspects as the effects of selective feeling of trees in natural forests resulting in secondary bush growth and disappearance of the valuable species, clear cutting of forest land resulting in erosion and precipitate evacuation of rain water. Examples from other industries include for instance the undermining of land or sea bottoms by the extraction of gas - the sinking Venice - or mining causing risks for the mines to cave in.

VII. Complexity of TVE/EE Programme:

To design programmes of environmental education for technical and vocational education systems is a complex task. The main reason for this is the complexity of such systems - the wide range of technological applications covered by them and the many levels at which such education is provided. When the design is to cover also adult further education on environmental issues a further complication is the wide spread between functions carried by technical personnel at the various levels. To this should be added the many public and private bodies - educational authorities, labour inspectorates, technical research and development institutions and operating enterprises - which all have contributions to make in the selection of priorities in environmental education for technical personnel and in the provision of such education in schools and technical colleges and institutes of technology, in full-time and part-time education or in specialized programmes of adult education.

Internationally the situation is even more complicated by the fact that different countries approach the organization and implementation of programmes of technical and vocational education differently. Higher technical education, had been professionalized in most countries, but intermediate levels of technical education are less homogeneous. Specialized and skilled workers receive their initial training in lower technical

and vocational education or apprenticeship. This diversity both facilitate and complicate the extention of EE in TVE.

A complicating factor in the design of environmental in technical and vocational education is the degree of specialization and the great differences in subject-matter taught in the various streams of technical and vocational education.

Specialization gets more pronounced and needs to be taken more into account at intermediate and lower technical and vocational education. While the practices differ between countries, technicians are divided between a wider range of streams than students in higher technical education; at the level of lower technical and vocational education the number of speccializations is often extremely high. In several industrial countries the number of 'apprenticeable occupations' is somewhere between 350 and 700 and some systems of vocational education cater for as many as 100 different skilled occupations, not counting complementary apprenticeship training arrangements. Although a majority among the students in such systems are found in 20-odd occupational classifications for the boys and some ten classifications for the girls, attention also needs to be given to the remaining smaller classifications, especially when these are particularly environment-related as some of them are. Again , while part of the environmental education needs are similar in broad groups of occupations, each specialization may have characteristics, which necessitate some variation in the approach to the environmental education to be included in the courses.

EE should address adult training systems, extension services, industry development efforts, public and private enterprises, training activities of economic organizations and all other delivery systems.

VIII. Planning EE for TVE:

There are a set of conclusions to draw from the considerations set out in the preceding part. These might be summarized as follows:-

1. There is a body of general environmental education that should be covered already in the educaional process preceding technical and vocational education. At the level of technical and vocational education and training the principal aims should be - with regard to these a aspects - to reinforce the environmental education already provided.

2. At the level of technical and vocational education the principal subjects in environmental education are directly related to the occupational area in which the students are likely to be employed after graduation.

3. There is a distinction to make between the contents and form of environmental education at the various levels of technical and vocational education.

4. Environmental education should be a lifelong process for technical personnel.

5. Environmental education for students in technical and vocational education and for persons already employed in technical activities at engineer, technician or skilled-worker levels should be provided through a multitude of channels.

IX. Levels of EE for TVE:

One could easily differentiate between three different levels of EE for TVE:

1. General EE:

Assuming that students in higher technical education are already familiar with such concepts as the ecosystems, energy flows in the various components of the earth ecosystem, materials flows in the biochemical cycles, population dynamics and major effects of human enterventions in the natural processes.

Institutions for higher technical education should test the attitudes, knowledge and understanding of them among the applicants or, at the latest, during the first year of study. To ensure appropriate teaching of environmental issues they should also communicate the results of their tests to the authorities responsible for secondary education with a view to such improvements as may prove desirable or necessary to ensure that environmental studies at the level of higher education can build on a firm foundation of knowledge of facts about ecosystems and the environmental risks existing in modern society and about the measures that have or need to be taken at macroeconomic levels - including international action - to cope with them.

Lower levels of techinical and vocational education cannot, in the same way, count on initial work having been done by the schools.

What has not been done in the schools before entry into inermediate or lower technical or vocational training with regard to general environmental education must be integrated into the curricula of technical and vocational studies.

2. Initial Occupation oreinted EE:

In technical and vocational education the primary aim of EE is to provide the awareness, knowledge and skills required for individual and collective work in solving the acute environmental problems which exist in a particular field of economic activity or result from work in a particular occupation and to prevent new problems to arise in the outer or inner environment as a result of technological or economic change in such activities. It should further aim at improving the environmental situation at the work place as well as in the interaction between the activity concerned and the community environment.

While the technology to be covered will differ depending upon the level of studies and the field of activity concerned,a few basic objectives may be set out for such a change in the aims of technical and vocational education:

(1) To create awareness of ana provide the required technological.economic knowledge and skill for dealing with the environmental problems relating to the principal products of the field of activity concerned; the possible elimination of such problems and the principal technical solutions to them;

(2) to create an awareness of and provide the required technological/economic knowledge and skills for identifying and dealing with the environmental problems arising out of the production process which are current in the field of activity concerned, including:

a. recycling or direct use of process by-products;

b. waste disposal techniques, including separation technology applying to polluting elements in air, water and solid materials, storage and destruction of polluting and toxic agents and elements or,as the case may be, their transformation into non-toxic waste;

c. as appropriate, restoration techniques when the production process involves direct damage to landscape or other elements in the environment; this should include familiarization with standards applying to the industry concerned contained in legislation or recommendations by the competent authorities or other bodies;

(3) to create an awareness of and provide the required technological knowledge and skills - including safety-mined attitutdes - for identifying and dealing with problems relating to safety and health of those involved in the work process, including possibilities for eliminating such environmental risks, or, as

the case may be, protecting the individual or group concerned, also including the maintenance of such measures and the supervision of safe working methods.

3. Adult-further-environmental education:

There are a number of reasons why discussion and planning of environmental education in technical and vocational education should cover both the initial phase and adult, further education, involving upgrading, updating and, in some cases retraining. A few of them should be mentioned in this context as they have a bearing both on the selection of target populations and the contents of such education.

First, fast-moving technology makes continuing - lifelong and specifically targeted - technical and vocational education particularly important in the various fields of science and technology.

Secondly, there must be a certain correlation between what older generations of technical personnel know and what those in initial technical and vocational educational are learning.

Thirdly, older generations of technical personnel have acquired their competence in courses, in which environmental aspects were largely neglected.

The prime target groups in further environmental education for adults are, in the first instance, those who are responsible for products and processes and for the maintenance of appropriate prodedures at work: the managers research and development; maintenance personnel including those responsible for repair and maintenance after sale, e.g. garage workers, engine tuning, repair and maintenance of petrol supply systems and catalysators are examples of recent technological change requiring further training of those concerned and which has important environmental consequences.

x. EE for TVE Teacher Training:

Teacher training in environmental aspects of technical and vocational education differs in many respects from what needs to be done in teacher training in general environmental education. First, there are three distinct learning situations with different personnel responsible for the teaching process: teachers of theoretical subjects in the classrooms; instructors in practical subjects in the college and school laboratories and workshops; and engineers, foremen, technicians and skilled workers in job-based training and work experience.

Already in the universities, colleges and schools providing technical and vocational education there is a great difference in the educational background and levels of the different groups in the teaching staff. While at academic levels teachers normally have high level academic degrees based on essentially theoretical studies and research work, they are seconded in the laboratories and workshops by technicians and skilled workers whose general education normally- there are great differences in this respect between countries ended at the age of 16 with a part-time supplement of related instruction in the course of their vocational school training or apprenticeship. Formal teacher training is often required either of the professors or of the technical staff in laboratories and workshops at the level of technical universities as the qualifications required are normally, at the higher levels, proved research proficiency and wide-ranging knlwledge of the subject (mainly theoretical) and, at the lower level, highly developed skills, often supplemented by some practical experience from industry.

About the same situation exists in technician training institutions- theoretical subjects are taught by academically trained personnel, practical subjects by instructors with essentially practical training and experience. The situation has improved somewhat in some countries in recent years as technical teacher training institutions have been set up. But the general rule is still that in most countries qualification as a teacher in technical and vocational education is essentially based on academic merits for theoretical instruction and practical training and work experience for laboratory and workshop instruction in practical subjects.

The same division between two categories of teachers exists in most vocational school systems. Here teacher training is generally even less developed in many countries. Especially workshop instructors are given a few weeks of special teacher training - mainly pedagogical subjects - before they start their work; their essential qualification is that they have completed basic technical /vocational training and have some experience from practical work in industry. In many developing countries where the colleges and schools have difficulties in competing with industry in recruiting competent staff, instructors often come directly out of the vocational school, receive some aditional teacher training, but are lacking practical experience from real work situations.

## A.7.3 RESUME OF STRATEGIES FOR THE INCORPORATION OF ENVIRONMENTAL EDUCATION INTO CURRICULUM AND TEACHER TRAINING IN INDUSTRIAL SCHOOLS

I. The document covers the area of industrial education curriculum design and the area of environmental education curriculum design.
Incorporating EE into IE is covered as well.

II. Main Definitions

Vocational Education

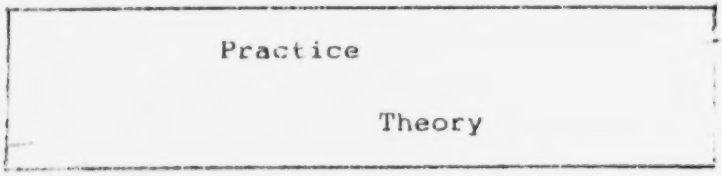
Programme encompassing education and training for more specific and high level skill proficiency in industry & agriculture leading to jobs on the shop floor/farm.

Technical Education

That system of further/higher education which include all educational programmes which prepare students for a variety of occupational specializations in industry and agriculture to function as Engineer, Technologists, Technicians, Supervisors, Foremen. Their activities cover: Planning, design, research, operation, inspection, supervision, production, and processing.

III. Role of the Skilled Workers and Technicians

The relation between the theory-practice continue and manpower level could be represented as follows:




Skilled Worker Technician Eng.

IV. Traditional Aims and Objectives of IE.

To provide an adequately trained manpower that will make industry and commerce more productive by increasing both the volume and the quality of goods it produces. Simultaneously developing the students into responsible citizens and should provide an opportunity to each individual for optimum development depending upon his capabilities and potential.

V. Role of IE in Environmental change

The role of IE could be of two distinct types:

- Reactive:
  React to policies and directivies handed to them by ministers and government departments.
- Pro-active:
  Consider their system more complex. Envolvement of national & regional persons and projects is recommended

VI. Factors Affecting EE into IE

There are wide variations in the field of industrial education that affect the EE, some of these factors are:-

- National Policy.
- Role and objectives of Educational System.
- Extent of existing linkage between industry & educational institution.
- Location of institution and surrounding community.
- Linkage between environmental.
- Leadership of the institution.
- Staff and students .
- Responsiveness of curriculum.
- Time and money available .

VII. Essentials of EE into IE

- The philosophy: Deviding courses into Four main categories:-

a) Compulsory core subjects or topics.
b) Compulsory related subjects.
c) Elective optional subjects.
d) Common electives for all Disciplines.

- The approaches: any of the following approaches singly or in combination:-

a) New teacher training.
b) Inservice training for teachers.
c) Training in Industry.
d) Industrial school curricula.

- Guide lines:

a) Defining Policies, Aims and approaches.
b) Content for General EE.
c) Content for EE into IE.
d) Content for EE into each trade.

- Strategies:-

a) EE committee.
b) EE coordinator and Evaluator.
c) Curriculum development unit.
d) Instructional materials preparation unit.

e) In-service training unit.
f) Community & industrial liaison unit.

- Proposed activities:
a) Development of prototype curricula, programmes, structure methodologies and teacher training programmes
b) Development of suitable Text-Books, Work-Books and Instructional Modules.

## A.7.4 SUMMARY OF CASE STUDY ON THE INCORPORATION OF EE INTO THE SCHOOL CURRICULUM AND TEACHER TRAINING OF TECHNICAL SCHOOL IN SINGAPORE

### Introduction:

Singapore is a relatively industrialized nation in the Far East with a size of 616 kms and high population density of 3, 918 persons per sq km.

Singapore has a separate ministry for E.(1972), which works in close collaboration with the ministries of Health, Education and National Development.

### Education System in Singapore:

Primary Education (6 years) is free. Age (6-11)
Secondary Ed. (4 years) with nominal fees. Age (12-15)

### EE at School Level:

EE is not taught as a subject at the school level. Different subjects include content related to the study of ecological and environmental education.

- Man and his Environment is taught at primary 3-6 Levels.
- "Human and social Biology" is taught at secondary 3,4 levels.
- "National Health Campaigns".
- The Vocational & Industrial Training Board(V.I.T.B):

The goal is to produce highly skilled crafts men: Motor Vehicle Mechanics, Airconditioning & Refrigeration Mechanics, Welders.....

- The Poly technic System:
The goal is the training of middle level and shop floor manager and supervisors for Engineering Industries.

- Degree level Courses:
Goal is to provide Engineers

EE Components:

1. Certificate Courses in V.I.T.B:

Components of EE such as noise pollution, ventilation, chemical handling, vibration control etc. are covered as topics in related Engineering subjects.

Examples:

- Wood Machine Safety.
- Outline safety rules & Precantions in wood machine shop.
  - . Relate personal safety & machine safety for prevention of accidents.
  - . Describe elementary knowledge of first aid for superficial cute, burns and electric shocks.
- Air conditioning & Refrigration Course.
  - . Safety precautions.
- Electriced Fitting and Installion:
  - . Safety procedures.
  - . First aid to electric shock.
- Food preparation:
  - . Personal & Food Hygiene,
  - . Pest Control, Food Poisoning.
- Heavy Duty Diesel Mechanics:
  - . Smoke and Temperature Tests.
  - . Safety Devices.

II. Diploma Courses at Polytechnics

. Environmental Sciencee:

Problems related to the environmental conditions of buildings & Spaces with regard to heat, ventilation, light & sound.

. Water Supply & Sewage:

Water Sourses, distribution of water, Design of water works.

. Thermal & E. Engineering:

Steem, combustion, boilers, petrol & diesel engines and air comprassors, Environmental Science: Air, Water & Sea pollution effects, Industrial Water Treatment.

- Engineering Fundamentals & Pollution Control

Hydraulics and Hydrology.
Water Supply Engineering.
Water Quality Analysis & Treatment.
Water Treatment & Wastewater Engineering.
Pollution Control.
Public Health Engineering Construction.
Building Construction & Maintenance.
Building Water & Fire Protection Services.
Building Sanitary & Gas Services.

III. Degree Level Courses in Eng. & Tech.:

- E. Engineering I.
- E. Engineering II.
- Air Pollution.
- Advanced Water & Water Engineering.
- E. Modelling.
- Urban E. Management.
- Water Quality Management.
- Environmental Health Engineering.
- Industrial Water Control.

EE Methods:

- Lecture.
- Tutorial Sessions.
- Laboratory /Workshop Sessions.
- Field Assignments.
- Group Projects.

Evaluation Methods:

- Continuous Assessment.
- Assessment of Practical Work.
- Assessment of Project Work.
- Assessment of Attitudes & Values.

Recommendations:

- Include components of EE in the Curricula for Teacher Training
- Emphasize the technological aspects of E. Protection to students through case studies & Projects of an Inter disciplinary case.
- Encourage greater use of non-traditional teaching/ Learning methods such as seminars, Group discussions Case Studies, Simulation, Games ....
- Encourage Teachers to write text books and produce other print & non-print teaching/learning resources for EE Components of Curricula.
- Encourage Students to enrol themselves for practical training in E. related industries, sewage disposal & water treatment plants, food analysis Lab.....etc as part of their course requirements.

## A.7.5. CASE STUDY ON INCORPORATION OF EE INTO INDUSTRIAL EDUCATION IN JAMAICA

System of Education In Jamaica:

To start with, it becomes reasonable to introduce the Jamaica Educational System to acquaint the reader with the place of industrial Education in the system.

Current Structure of the Education System in Jamaica

| S/No. | Levels | Ages | Grades | Institutions |
|---|---|---|---|---|
| 1. | Pre-Primary | 4 - 5 | | Infant and Basic Schools |
| 2. | Primary and | 6 - 11+ | 1 - 6 | Primary Schools |
| | All-age | 6 - 14+ | 1 - 9 | All-age Schools |
| | | 6 - 9 | 1 - 3 | Special Schools (handicapped) |
| 3. | First-Cycle | 12-14 + | 7 - 9 | Junior Secondary Schools |
| | Secondary | 12-14+ | 7 - 9 | Comprehensive High Schools |
| | | 12-14+ | 7 - 9 | High Schools |
| | | 13-15+ | 8 - 9 | Technical High Schools |
| 4. | Second-Cycle | 15-19 | 10-13 | High Schools |
| | Secondary | 15-19+ | 10-11 | Technical High Schools |
| | | 15-17+ | 10-11 | Comprehensive High Schools |
| 5. | Vocational | 15+ -17+ | | Vocational Schools |
| | Education | 15+ -17+ | | Trade Training Centres |
| 6. | Teacher | Entry at 17 Pre-teacher training | | Teacher Training colleges |
| | Training | Entry at 17+12 Week course | | Caenwood Junior College |
| 7. | Further | Entry at 17+ | | C.A.S.T. |
| | Education | Entry at 17+ | | College of Agriculture |
| | | Entry at 17+ | | University of the west Indies |

Objectives of Industrial Education:

Industrial/technical or vocational education is defined as an orientation and exposure to the subjects which give knowledge and skills upon which students could build for a future career. It is a program which aims at supplying necessary knowledge and skills for specific occupations.

Technical Education in Jamaica is formed to adequately meet the demands of the specialized nature of industry. The courses

are designed to meet the need of the manufacturing and processing and to produce all levels of technical man power.

At the lowest level the objectives of the technical/ vocational system-in Jamaica-is to provide a group of junior technicians for industry as well as a scope in higher Education. Objectives are stated as follows in the 1978-1983 plan:

1. To incrporate introductory experience in technical/ vocational Education for all students.
2. To develop basic knowledge and skill leading to vocations.
3. To develop basic knowledge and skill leading to tertiary level technical Education.
4. To explain the provision for the training of teachers in in-service programs for tech. voc. teachers.
5. To provide the co-Edination of technical and vocational Education at the national level.

## COURSES IN TECHNICAL HIGH SCHOOL

### Certificate courses at Technical High Schools:

The following are the topics in the curriculum of Technical High Schools relating to Environment and Occupational Health in various courses.

a) Auto Mechanic:

* To know the hazards when repairing steering suspension systems. automobile tubes and tyres.
* To know hazards when operating: portable disc, grinder, bench or drill press, welding equipment.
* Knowledge of hazards of fuel and ignition vigilant supervision and correct ( safe) work procedures in the use of hand power tools.

b) Cabinet Making and Carpentry:

* Safety rules in the carpentry shop.
* Personal and machine safety of work place by hand tools and machines.
* Organization of safe work, use of fasteners and adhesives.
* Elementary knowledge of defects of wood, preservation and insect attack.

c) Machine Shop and Welding:

* Emphasis on correct (safe) supervision with hand and power tools for safety.
* Hazards when operating the oxyacctylene outlet for welding.
* Lubrication and its importance.
* Importance of wearing safety apparel.

d) Plumbing and Pipe Fitting:

* Emphasis on safety with tools.
* Hazards when operating grinder, drill press, threading and pipe bender.
* Operating principle of Solar heaters.
* Corrosion resistance.
* Describe the operating principles of public sewage and septic tank system and waste water drainage.
* Importance of safety apparel.
* Related knowledge of water meter and conservation of water.
* Conservation of energy.
* Source of water and water quality for irrigation.
* Knowledge of pumps.
* Water quality, treatment and pollutants, pollution control, industrial pollution control and hazards related to sewage system and storage drains.

e) Electrical Installation:

* Emphasis on safety procedures.
* Importance of proper earthing.
* Related knowledge of electrical safety.

f) Industrial Arts Education:

( Electrical, Metal work and wood work)
* Safety in industrial arts shops.
* Care in handling electrolytes.

g) Community and Health Care:

* Health and safety.
* Nutrition awareness.
* Emphasis on health and hygiene.

h) Fabrication and Welding Technology:

* Safety precautions specific to soldering and brazing.
* Handling gas cylinders, explosion risks.
* Electrical hazards.
* Fire precautions.
* Safety guards, protective clothing and equipment.
* Personal hygiene.

i) Maintenance Engineering Technology:

* Corrosion.
* Safety precautions-storage, siting, handling of gas cylinders.
* Fire precautions.
* Safety guards and personal hygiene.

* Safety precuations particularly relevant to transmission systems.
* Methods of protections of electric supply-environmental.

j) Electrical Engineering Technology:

* Disposal of excess heat and waste products from thermal power plants.
* Advantages and limitations of using natural energy resources.
* Fuel used in steam turbine power stations, e.g coal, oil and nuclear.
* Protection systems.

k) Mechanical Production Technology:

* Safety precautions, electrical hazards, safety guards and personal hygiene.
* Principles and characteristics of lubricating systems.
* Safety precautions particularly relevant to transmission systems.
* Chips produced during machining and disposal.

l) Agricultural Science:

1. Local and Regional Agriculture:
* Materials for industry.
* Understand the importance of forestry to the national economy, world food, fiber and forestry production.

11. Soils:
* Understand the nature of physical environment and the effects of interaction of its components on agriculture.
* Soil conservation.
* Ecological importance of forests with particular reference to soil and water conservation.

111. Crop Scienee:
* Importance of safety precautions in handling chemicals and disposal of containers.
* Effect of environmental factors on growth and development.
* Heredity and environment.

IV. Animal Science:
* Livestock Nutrition-simple breakdown of cellulose.
* Disease precautions for livestock.
* Control of environmental conditions.
* Disposal of carcasses.
* Health and Disease precautions.
* Removal, conservation and use of manure.

* Pasturization and deteriorations of milk.
* Fishing industry and aquaculture.

V. Farm Mechanization:
* Sources of power eg. water wheel, wind, solar energy.
* Irrigation and drinage systems.

m) Géography:

* Knolwedge of physical and human environment especially of the Caribbean.
* Understand how aspects of the environment interrelate to influence the activities of man and how man's activities in turn, affect and change the physical environment.
* Weather, climate, vegetation types.
* Soil erosion, conservatins and reafforestation.
* Identify and describe the ways of industrial pollution.

n) Biology:

* Man as a prt of his environment.
* Importance of soil to living things.
* Ecological studies.
* Understand the effects of man's activities on the environment and an appreciation of the finite nature of world's resources.

o) Chemistry:

* Major and alternative energy sources and conservation.
* Describe carbon, nitrogen and water cycles and the importance of living systems.
* Discuss the consequences of the solvent properties of Water including hardness and pollution.
* Discuss the importance of non-metal and their compounds to living systems and the environment, including pollution of $SO_2 \cdot CO_2 \cdot HS$ .
* Effects of production on the environment.
* Balance of nature and safety consideration.
* Water purification in industry.

p) Social Studies:

* Health of the environment.
* Energy in relation to domestic, industrial and agricultural needs.
* Distributions and use of:
  - renewable resources: agricultural lands, water, forests, beaches, marine life.
  - non-renewable resources: oil, natural gas, bauxite, other minerals.
* Pollution and conservation of the environment.

* Tourist Industry versus conservation of the enviromment.
  - Changes in ecology, tidal patterns, reefs, etc.
  - Sewage disposal and pollution of the sea.

---

## DIPLOMA CHEMICAL TECHNOLOGY AT CAST

This course was implemented in the academic year (1987-1988) with special reference to Environmental Technology Training. The details of the topics in 3 years are as follows:

First Year:

Fundamentals of Chemical Technology - 1 Unit Only

Environmental Control

Ecology, importance of environmental control, main pollution problems of Jamaica including solid, water and air. Environmental agencies in Jamaica (Goverment and NGO's). Industrial waste treatment and its importance to econom. Existing laws of pollution control in Jamaica and EPA standards.

Second Year:

Environmental Chemistry: Semester Course:

- Introduction to environmental problems.
- Characteristics of water and waste waters.
- Air pollution.
- Treatment of garbage disposits, garbage dressing and annihilation.
- Selected Topics.

Third Year:

Industrial Safety: Semester Course:

- The meaning of accident prevention in widest sense.
- Historical background to factories act and regulations, recent developments, the health and safety act ( if any).
- Responsibilities to the public.
- The principles of accident prevention.
- Accident statistics.
- Hazards.
- Protective devices and equipment.
- The final responsibility.
- Product safety, management responsibilities, audits and reviews.

Pollution Control: Semester Course:

- Environmental criteria and standards.
- Pollution.
- Water and Waste Analysis.
- Industrial Waste Water Control.
- Environmental Management.

Water and Waste Water Treatment: Semester Course:

- General Aspects of water.
- Water Treatment Processes.
- Conventational Treatment Methods.
- Legislations and Regulations.

---

## INCORPORATION OF EE

### Major Achievements In The Incorporation of Environmental Education Components

Environmental Education is not a part of the curriculum in Technical and Vocational Education System in Jamaica. No doutb,the present syllabuses in the different curricula of Teachnical and vocational courses create a consciousness for a sustained environment; although the effect of these cannot be directly evaluated. Currently, there is a special emphasis on beautification and cleanliness of cities especially in Kingston, the capital of Jamaica and other parts of the country. The one million tree planting compaign is another example of ecological balance and beautification.

Students currently prusuing the Chemical Technology Diploma and Physical Planning Technology diploma at CAST are aware of more knowledge of Environmental Technology. Graduates can choose to work with environmental regulatory agencies of Jamaica, such as the Natural Resources Conservation Department (NRCD) and Environmental Control Division (ECD).

The Ministry of agriculture mentioned that soon Jamaica will be enforcing forth e monitoring of industrial pollution, No doubt, these graduates will be an asset to Jamaican industries for the safe disposal of industrial effluents, water supply, sewage treatment and disposal, as well as maintenance of similar conditions.

The Incorporation of Environmental Education in the school curriculum of technical high schools and technical and vocational education system of Jamaica will increase the awareness and influence of environment in the daily life of Jamaicans. But the achievement of the intent of Environmental Education will depend upon the following:

1. Government policies on environmental protection.
2. Pressure from industries as well as public, professionals, and professional organizations.

3. Available resourses.
4. Assistance from International organizations such as PAHO, WHO, UNESCO, UNEP, ETC.

---

## EE METHODS

Environmental Education Methods Emphasized:

In the various programmes of education and training offered at the technical and vocational institutions in Jamaica EE does not form a separate course of study. It forms a part of the subjects in various technical and vocational programmes. So, no separate methods are employed for teaching the Environmental Education components of the curriculum in Technical and Vocational Education.

The methods of instrtuction used in most of the Jamaican institutions are:-

Lecture:

This is the main method for delivering the main aspects of the curriculum. The class size of Technical High Schools in Jamaica varies from 70-300 (grade 7-11). In the Agriculture school the enrolement is as large as 100. The CAST class size varies from a minimum of 20 to a maximum of 40 students. The teachers at CAST often use overhead projector, but other audiovisual aids such as film and slide projectors are not used regularly.

Project Work:

At, CAST, instructors guide a group of two or three for special projects. . This also includes environmental problems of Jamaica in some courses.

Tutorials:

Tutorial sessions for solving individual and group exercises are not practiced in Technical/Vocational Institutions in Jamaica.

Assignments:

In both Technical High Schools and CAST, certain subjects are assigned to students to prepare the special topic through literature survey and submit to the teacher concerned. This is also a basis of marks in final examination at CAST in few courses.

Laboratory/Woskshop:

Students are trained to acquire skills by practice on machine/engines/lab work or field survey in various technical

courses at CAST, whereas in technical high schools, lab components in workshop practices are very important Aproximately 29 percent of the curriculum is practical training.

---

## RECOMMENDATIONS FOR INCORPORATION OF ENVIRONMENTAL EDUCATION INTO INDUSTRIAL EDUCATION

1. The Ministry of Education, the Ministry of Youth and Community develpment and the Ministry of Agriculure should prepare guidelines and working documents for the incorporation of Environmental Education at school level and technical and vocational institutions.

2. Tertiary institutions such as CAST must include Environmental Education components in their curriculum to an extent, depending upon the needs of the course.

3. Curriculum for teacher training and an additional course on Environmental Education especially the technical teacher's training done at CAST and VTDI.

4. The emphasis of Environmental Education should be based on case studies and projects based on local problems encountered.

5. Curriculum should achieve the objectives based on the local needs.

6. The scientific community of Jamaica write and produce teaching materials which can be used in general and specialized courses.

7. The Ministry of Education should help for the preparation of teaching manuals, etc., from organizations such as FAO, UNEP, UNESCO and UNDP.

8. IEEP should encourage the exchange of information on the inorporation of Environmental Education at least among the Caribbean countries as part of their network on information

9. Various institutions including CAST played an active role in environmental awareness in the recent past. NGO also organized conferences,symposiums and seminars on Environmental matters. The same should be encouraged and financed through Central and Local Government, or international organizations.

10. The Ministry of Agriculutre, currently responsible for the environment, is planning to set up a National Environmental Institute. Environmental Education should be funded through

UNESCO or UNEP, and INFOTERRA of UNEP should provide sufficient lecturing literature to this or similar type institutes in Jamaica.

11. Documents on general guidelines, objectives, concept of Environmental Education, course structure, syllabuses, National/International directories, resource book on Jamaica Environmentalist should be prepared either nationally or by international organizations. The Ministry of Education or Ministry of Agriculture could identify the possibilities of preparing the same at National level.

---

## A.7.6. SUMMARY OF CASE STUDY OF THE INCORPORATION OF EE IN THE SCHOOL CURRICULUM AND TEACHER TRAINING OF TECHNICAL SCHOOLS IN CZECHOSLOVAKIA

Introduction:

EE in secondary technical schools can not be concerned in isolation but as a specific part of EE in general and on a broader scale also in relation to the entire social system of EE.

1. Basic postulates of EE in secondary technical schools:

1.1 Concept of the problem area of the environment.

- Current environmental problems are the consequences of a number of quantitative and qualitative changes in the relations between man and biosphere.
- Man's relations to the environment are not only ruled by basic ecological laws which apply in nature but also by economic, sociopolitical, aethetic, ethical and other aspects.
- Man must learn to know, understand and respect the ecological laws of the biosphere and the complex ecological needs of his own relations to the environment, and should avoid the negative impacts of scientific, technical and economic development on the environment.
- Success in implementing ecological principles in the life of every indiviual and in the life of social entities depends on the attitude of people to the environment.
- The formation of man's environmental attitudes is a very long and complex process, practically life long.

1.2 Concept of EE:

- EE is conceived as the complex influencing of man's attitudes towards the environment.
- EE is implimented at many inter-related levels namely: family, school, out of school activities, experiences, practices, and quality of the environment.
- Short term objectives in the formation of environmental attitude should include the limiting of negative impacts on the environment, the establishment of responsibility, sensitivity,intiative, activity and ingenuity the solution of environmental problems.
- Long term objectives should more explicity be shifted to the purposeful and consistent prevention of negative impacts on nature, to the development of creativity in the establishment of optimal relations between man and the environment.

1.3. Concept of school environmental eucation :

- The system of school EE has a specific central position in the entire process of forming the qualitatively new ecological attitudes to the environment.
- The EE system in the School is formalized in a way which solves the resticial follow up of grades and the horizental coordination of EE through different subjects.
- The basic elements of EE are the project (programme) of EE, the teacher, the pupil and the conditions for EE and their inter-relations.
- The EE project ( programme) specifications follow the system approach. The basic elements are: the objectives (tasks) of EE, the content the mean and the prerequisites for EE in the school.
- The specification of the EE system should at all levels and in all types of schools solve the following problems.
  a) The organic and informal interwining of the different components of EE with all elements of the educational structure.
  b) The incorporation of comprehensive, complex ecological subject matter into the structure of education in form of indipendent thematic units.
  c) The specifications of activity teaching methods, procedures and forms of EE corresponing to the individual areas of general and specilized education.

d) The clarification of possibilities of inter-subject relations and the complex impact of the school.
e) The preparation of teaching and learning aids for EE.
f) The use of school environment and its surrounding for EE.
g) Training of personnel for the implementation of EE.

- The implementation of the comprehensive system of EE takes a certain procedure as follows:
  1. Theoretical elaboration.
  2. Analysis of the concrete possibilities of implementation of individual elements of EE in different subjects and in the overall work of the school.
  3. Experimental verification of the drafts in school practices.
  4. Processing experience.
  5. Gradual implementation.
  6. The specification of different areas of EE with regard to the regional and other specific conditions.
  7. Evaluation of continuous innovation of EE.

The EE system in Czechoslovakia:

- EE is introduced in two basic stages, the immediate introduction and the long term processes.
- A comprehensive system of EE is being elaborated within the frame work of the respective research project. The system is gradually being tried and introduced into practice.

II. EE in secondary technical schools in Czechoslovakia:

2.1 Position of secondary technical schools:

- In Czechoslovakia compulsory school attendance is organized by the state, in ten years for all youth and has a unified general core.
- School attendance starts at the age of six. Primary school has a four years first level and a four years second level and is unified for all children. It provides general basic education. From primary school children advance to three streams of secondary school, namely:
  a) Secondary general education schools (4 years).
  b) Secondary technical schools ( 4 years).
  c) Secondary vocational schools (2-4) years.

- In secondary technical schools general education prevails in the first two years of the study course while specialized education in the given fields prevails in the second two years.
- The system of school education is supplemented with varied out of school activities of youth which are primarily organized by the socialist union of youth.

2.2 Characteristics of secondary technical schools with regard to EE:

- The importance of EE at secondary technical schools is linked with the level of mental maturity reached by the pupils of these schools and the position of secondary schools in the educational structure.
- The main ojbectives of technical schools are:
  1. To provide students with general education,
  2. to prepare students for direct envolvement in practical life,
  3. to prepare the best of them for higher education.
- Basic tasks of EE in secondary technical schools are as follows:
  1. to secure the follow-up of EE on primary school education,
  2. to incorporate EE in general education subjects,
  3. to complete education with comprehensive, complex ecological information,
  4. to incorporate EE in technical subjects,
  5. to complete comprehensive technical information or relations of the chosen field to the environment, including possible solutions of related problems in the given field,
  6. to implement EE in the overall import of the school subjects, activities and events,
  7. to implement EE in the follow-up between the school and the outside world.

2.3 Follow-up of EE in secondary technical schools on EE in primary schools:

- EE in primary education penetrates all subjects in compliance with their content and methodological scope
- Primary school creates a wide range of prerequisites for EE in secondary school with regard to methodology.
- Knowledge on EE knowledge and activities in primary school is important for the incorporation of EE in the curriculum of secondary technical schools.

2.4 EE in the basic pedagogical documents:

- The initial pedagogical documents for every study field of secondary technical education is the concept of the field which provides activities for which students are being trained and gives a characteristic of the content of education.
- The syllabus contains a system of general educational and technical subjects, their distribution into the individual years of study and provides the number of teaching hours and the general basic organization of instruction.
- The subjects in the syllabus are basically of three types: compulsory, electives and optional.
- EE is projected into the syllabus when it comprises a comprehensive subject concerning environmental problems.

2.5 EE in general education in secondary technical schools:

- The basic objectives of EE in general education are unified for all types of secondary schools. This is the relative completion of the system of knowledge, skills and habits needed for the basic comprehension of the position of man in nature.
- The methodological specification and arrangement of the subject matter is adequate to the integral personality of the students and to the analytical and synthetic process of thinking.
- The subject matter must be arranged in follow-up on primary school so as to complete and deepen knowledge, skills and habits with regard to EE and to provide a comprehensive ecological view of man's relation with his environment, a view of the existing environmental problems and their solution.
- The implementation of elements of EE in all subjects must be natural, must comply with their character and must use their possibilities with regard to content and methodology.

2.6. Comprehensive ecological information in secondary technical schools:

- The comprehensive view of man's relations to the environment of secondary level should be formed in three stages: ecological prerequisites, current problems of man's relationship to the environment and the solution of environmental problems.
- Very important for EE are the relationships between

the implementation of the indiviual elements and the comprehensive view of man's relationship with the environment.

2.6.1 Comprehensive subject matter concerning man's relations to the environment in curricula of secondary technical schools:

- The comprehensive subject "Man and the environment" was introduced in the curriculum of the second year of study of the technical school in such a manner as to be related to the general educational element of education and to establish the basic ecological prerequisites for introducing ecological aspects in technical subjects in the subsequent years of the study course.
- This subject acquaints the students with the general laws of life, leads to understand the basic ecological relationship in nature and the biosocial aspect of man and to recognise and understand man in the present stage of scientific, technical and civilization development. It emphasises the active attitude of man to the organisation of his own way of life, the responsibility of the individual in relation to the environment and the function of the state in case of the environment.

2.6.2 Comprehensive subject matter on man's relation with the environment in the curricula of secondary technical schools (foresty schools):

- The comprehensive subject matter on man's relations with the environment contains the same units as does the comprehensive subject "Man and the environment". These units are specified with regard to the respective orientation of the school into a greater number of lessons, and are basically contained in the subject "Biology" in the first year of study and in the subject" Protection of forests and the environment" in the third and fourth years of study.

2.7. EE in technical education in technical secondary schools:

- The basic objective may in general terms be formulated for all types of secondary technical schools as follows:
  a) To acquire knowledge, skills and habits important for the active protection, moulding and improvement of the environment in the process of any working activity.
  b) To develop interest in environmental care and the ability to take a creative approach to the solution of environmental problems in any area of human activity,

c) To inculcate professional responsibility for bearing impact on the environment in any job assignment,
d) To premeate the ecological aspect into technical thinking and behaviour.

- Specific objectives agree with the specific relations of different fields of human activity to the environment. They concern both the development of technical education and the development of emotions and specially the development of professional technical activity.
- Components of EE are organically incorporated into almost all theoretical and practical technical subjects in accordance with their basic content and methodology.
- It was recommended that the specification of the subject matter of all subjects should incorporate concrete units related to problems of the enviroment differentiated by the character of respective subject.

2.8 EE in secondary technical schools in the overall impact of the school:

- Curricula express the requirement of the overall impact of the school in EE, of inter-subject relations, outdoor school interest activities, the development of specialist interests and creatinity of students. Curricula define the content and orientation of elective and optional subjects.
- Inter-subject relations have singular importance in EE with regard to the multidisciplinary nature of environmental problems.
- Elective and optional subjects oriented to EE are incorporated as a possibility and recommended in the curricula but their implimentation usually depends not only on the interests of pupils but also on the attitude of the school.
- Bevelopment of interests activities related to the environment requires similar preconditions as the introduction of an elective or optional subjects. However, interests activities are not bound by curricula regularity and may use a wide varriaty of forms not limited in time.
- The environment of the school and its surrondings has great impact on the formation of students' attitudes to environmental care.
- The overall attitude of the school to environmental problems is significantly influenced by the type of the secondary school and the attitude of the school principal.

- The curricula of all study fields emphasise the need of learning comprehensive influence on the personality of the secondary student through cooperation between the school and the outside world namely practice.
- The curricula of all study fields recommend that suitable means and the necessary conditions be established for effective instruction.

2.9. Preconditions for EE implementation in secondary technical schools/experience gained within Unesco Project:

- The implementation of the EE system was experimentally tried within the Unesco Project in selected secondary technical schools.
- The analysis of all materials collected within the four years of the Unesco Project states the following advices:
  a) The primary prerequisite for implementing EE in the instruction of all subjects is the engagement of the teacher's interest in this field. This can only be done when the teachers are well informed of EE.
  b) Concerning the comprehensive subject matter relating to man's relation to the environment, the teacher, his specialized and methodological prepardness is of decissive importance.
  c) Students must be envolved in out-of school activities and actions oriented to EE.

2.10. Current practice of implementing EE in secondary technical schools in Czechoslovakia:

- The implementation of the EE system in practice is a long term process.
- Components of EE are gradually penetrating into all textbooks and teaching and learing aids. In this concention it will be necessary to influence and unify the basic approaches and terminology of large groups of authors.
- The comprehensive subject "Man and the environment" is as yet incorporated in the curricula as an elective optional subject in most study fields of secondary technical schools.
- The comprehensive thematic unit/possibly subject/ concerning the specific relations of the respectice study field to the problem of the environment has already been corporated in the curricula of almost all study fields.

- Conditions are gradually being created for the work of teachers in EE. Methodological instructions and specialized information has been issued to this effect for teacherss of secondary technical schools.
- Specialized articles relating to environmental problems and the relations of different study fields to these problems are being published for secondary technical school teachers. Attention is also being devoted to special educational media.
- A system of inserviee EE teacher education is being elaborated and gradually introduced.

2.11 Higher forms of EE in secondary technical education:

- Higher forms of EE are organised at secondary technical school is post-secondary study courses. These courses are run either within the respective secondary technical school or in special centers of technical education for secondary school students.
- Post-secondary study courses are designed for graduates of secondary technical schools who work in different fields of the national economy, in state administration or in other institutions where it is necessary and pruposeful to enroll in further education related to environmental students.
- The range of study course is usually set at 400 teaching hours, it is organised in the form of lectures, consultations, practicals and excurisions and it is mainly centred on individual self-instruction controlled by tutors.
- Various types of post secondary study courses have been taking place in Czechoslovakia since 1975 so that their many graduates work in different sectors of the national economy.

III. Teacher training for EE;

3.1. The personality of the teacher in EE:

- The teacher, instructorand instructor of technical training have decisive influence on the implementation of EE. They provide students with information, influence their emotions and stimulate their activity.
- Training of secondary technical school teachers for EE both the specialized and the methodological aspects of education, must engage the interest of teachers, influence their emotions, refer to their professional responsibility for the education of young generation.

- In effort to introduce comprehensive EE in secondary school it is important to devote attention to the training of the whole instructional staff of the secondary school and school principal and his deputy for EE.
- Teacher training for EE is implemented at two levels:
  a) Pre-service teacher training at faculties training for the teaching profession.
  b) In-service teacher training for EE.

3.2 Pre-service teacher training for EE:

- Pre-service training is a problem in itself. In Czechoslovakis it is being tackled within comprehensive educational research. The model of EE at teacher training faculties was discussed at Unesco subregional seminar which was held in Prague in 1980. The Model was suggested for implementation and in Czechoslovakia is full form has been experimentally tried. The model comprises the following objectives:
  a) To incorporate EE in all subjects of teacher training including methodological subjects and general pedagagy.
  b) To incorporate the comprehensive subject matter of EE and the fuction of the teacher in EE.
  c) To incorporate EE in practical training.
  d) To develop the interests and creativity of student teachers in the field of EE.
- All mentioned tasks must be combined and their implementation differentiated in training student teachers attending study courses of different subjects.

3.3. In-service teacher training for EE:

- This problem is also part of educational research. A comprehensive optimal model has also been constructed for in-service teacher training for EE which was discussed and recommended by the sub-regional Unesco seminar in 1980 in Prague.
- In-service teacher education for EE comprises several basic stages, of which the first two are compulsory for all serving teachers, the third is the highest form of training for EE and the fourth is a free from of self half instruction and self-education of teachers for EE.

- Stage 1 is connected with the induction of new teachers and mainly concerns the provision of information on regional problems of the environment of the school to which the graduate has been.
- Stage 2 is compulsory post graduate teacher education. This varies specifically according to the relation of individual general education and specialized subjects to EE. The compenents of EE are incorporated in the content of post-graduate education complicity and explicitly.
- Stage 3 comprises various forms of elective education of teachers and other educational personnel for EE. This is a higher level of specialized and methodological qualification for EE.
- Stage 4 is individual self education and the development of pedagogical creativity in EE. In this stage conditions are being created for the individual self education of teachers mainly by publication of specialized and methodological information.

## A.8 REPORT OF EDUCATIONAL FIELD TRIPS

### A.8.1. Visit to Alexandria:

The visit to Alexandria by the group took place on Thursday and Friday 17th and 18th Nov. 1988 respectively.

On arrival to Alexandria the group visited the Egyptian Copper Works which has been in existence for over 50 years and has achieved a vast experience in the copper work activities and its implications on the physical environment. The group was conducted round the works yard by a nominee of the company. During the tour of the works yard, the group was shown the ingots ( raw materials) which were being supplied by some of other companies around the country. Further the blast furnaces ( 3 in number) used for melting the ingots were also shown. This was followed by observation of the molten ingots which passed through various conveyor belts system to produce different types of products such as steel rods, plates, wires etc. It was also shown that scrap metals were being brought to the work yeard for recycling.

Participants of the course had a working session on Friday 18th Nov. 1988. Five countries reports from Ethiopia, Sudan, Tanzania, Iraq, and Kenya were presented and discussed.

The visit to Alexandria was rounded up with a cultural visit to the Royal Jewelry Museum.

### A.8.2 Visit to Helwan Iron and Steel Industry:

On 23-11-88 the participants of the Course visited Helwan iron and steel Industry located about 40 kilometers to the South of Cairo.

We drove along the River Nile Highway and took notice of the maximisation of water resources through the use of green houses, and intensive market gardening practices. Part of the journey took us to the Ring road where we noted extensive excavations of roch for use in the many cement factories and the Iron and Steel works at Helwan,

At Helwan we were well received by the staff. We were treated to tea and a video film featuring the mining at Baharia oasis, transport by rail to Helwan and the processing of the ores through to different forms of steel sheets bars and rods. A tour of the extensive steelworks was undertaken by car. We watched the process of bar making but from a far. This was an exhilarating experience as some of us had never seen a real furnace.

Adjacent to the main plant are two technical school of secondary level following the Ministry of Education syllabus but with a heavy input of industrial education by Helwan steel Industry. The equipment has been provided for by the Industry which also gives attachments to the students.

At Helwan also there is the Technical Training Institute In Hydraulics. This institute gives short courses to graduate engineers in various job experiences. Courses are tailor made. Lecturers come from various Universities, The Helwan Steel Plant and a Core staff of the Institute.

Helwan Iron and Steel Plant are aware about environmental protection. At the mines they have managed to accomodate workforce self reliant in vegetable products. The nearby oasis tern has also experienced afforestation after covering the original ground with soils from the mining site. At the steel plant the workforce has developed a small township. This is meticulously adorned with vegatation. The participants highly complement these desert reclamation efforts.

Waste disposal in form of smoke was pumped high over 120 meters and into the desert.Cooling water is collected in a small lake and reused severally. The sludge is dredged dried and used in the cement factories in Cairo.

The Participants expressed their gratitude to the general Manager of the Helwan Iron and Steel Plant and his entire staff for facilitating our visit to the Plant.